The Builder.

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Preservation of Stone.

ALTHOUGH "durable as a stone" has become an almost proverbial expression, it is hardly necessary to point out to practical men how perishable and unreliable many varieties are. A mere change of position or climate will often cause the rapid disintegration of stones which may have withstood atmospheric influences for ages in a situation favourable to their nature.

The causes of the decay of many stones have been several times the subject of inquiry, notably by the Commissioners appointed to investigate the cause of the serious destruction of the stone used in building the Houses of Parliament, and to suggest the best means of preventing further mischief. Their Report, published in 1839, was the most complete summary of the question up to that time, and contains much valuable information, and some questionable conclusions. Numerous articles have appeared since then in various technical and other journals, and several papers on the subject have been read before learned societies interested in the matter, but for the most part these have either been *résumés* of the Parliamentary Report, or else have been written in the interests of some one or another of the many patented protectives. It will be instructive to indicate the present condition of our knowledge on this subject, and may suggest some fruitful ideas to those whose interests may be with stone and stonework.

The chief conditions which affect the life of a stone are porosity, chemical nature, the atmosphere, soil or water that it may be in contact with, and the temperature to which it may be constantly or intermittently exposed. Vibration, great pressure, and position in a building also in some cases have their influences.

Porosity is a well-understood property of certain stones, although not always taken into full account. It is measured by the amount of weight gained by immersing the dried stone in water for a given time, say twenty-four hours. The degree of absorption varies widely from a scarcely appreciable trace in the case of hard crystalline blocks of dense structure to more than 20 per cent. in the case of common soft stones, such as certain sandstones, &c. The writer of a valuable, albeit popular, article* in 1860 brings this fact home to the mind in a striking form by the statement that "one square yard of building stone after being long exposed to dry warm air is capable of absorbing from nine to fourteen gallons of water, according to the nature of the stone, *before being saturated to a depth of one foot*, and in the earth each ton of stone never contains less than a pint, and may contain twenty-five gallons of water."

This porosity of stone is a matter to be carefully considered, but need not under all circumstances be regarded as a disadvantage. Where exposed to great alternations of temperature the destruction of a water-laden stone must obviously be rapid. Such a stone, moreover, would draw up by capillary attraction the ground moisture if by inconceivable ignorance, gross carelessness, or dishonesty, an efficient damp-course had not been interposed. On the other hand, in a building constructed of porous stone or brickwork more efficient ventilation and a more equable temperature can generally be maintained than is possible if the constructive material be of a hard, non-cellular nature. Pettenkofer's well-known ventilation experiment, in which a candle is blown out by a puff of air which has passed through two thicknesses of brick or porous stone (like sandstone, &c.), is a striking illustration of this porosity. When soaked in water such materials lose their perviousness to air almost entirely, but, inasmuch as such a condition seldom practically obtains, we may confidently assert that porous building materials containing only such water as they may have absorbed from the atmosphere are factors of some importance in helping to secure the healthy condition of the interior of buildings. "But the ubiquitous microbe may get through, as well as any foul gases that may result from insanitary external conditions," cries some one. As to the first objection, it has been proved by convincing experiments that finely-divided and porous materials will filter out most effectually the germs of fermentation, decay, disease, &c., from both air and water, if indeed such filtration be necessary in the vast majority of cases. As regards the second, the oxygen occluded in the pores of the stone would have some influence in modifying the character of many offensive gases; but still more to the point is the retort that it is self-evident that if external sanitary conditions are bad it would be practically impossible to maintain a pure atmosphere in a structure built of no matter how non-porous a material. If their strength, accessibility, and other conditions are favourable, the porosity of a stone need not be looked upon, sanitarily at any rate, as a drawback. The chemical nature of a stone is also to be taken into consideration in determining its suitability for specific purposes. Although chemical analysis will not always by itself indicate the best quality of stone, the mechanical condition of the aggregate particles being frequently of at least as much importance, there can be no reasonable doubt that it is of service, and will frequently prevent the employment of certain stone for obviously unsuitable purposes.

The chief building stones are the following: The sandstones which consist of particles of hard silica or sand bound together with more or less force with some cementing materials which may be of a ferruginous, clayey, siliceous, or calcareous nature, and the density of the stone will largely depend on the pressure to which it has been subjected during formation, and the amount of the cementing material present. In some cases the grains of silica are so loosely held together that the stone quickly disintegrates, and in other cases they are cemented by a substance quickly acted on by acid atmospheres of towns, &c., so that the cohesion is rapidly destroyed.

In 1873 Dr. Angus Smith, in a paper read before the Manchester Literary and Philosophical Society, proposed a plan for measuring the value of stones for resisting the air of towns, which consisted in the immersion of 1 in. cubes of the stones in solutions of hydrochloric or sulphuric acids and noting the deterioration of strength which resulted. Some sandstones under such treatment give way at once, while others, the cementing material being of a more resistant nature, will stand prolonged action of the acid.

The limestones, which contain as their main ingredient carbonate of calcium, are the most important and varied of the building stones used in this country. Some varieties, such as dolomite or magnesian limestone, contain, in addition to the carbonate of calcium, carbonate of magnesium, and are not regarded as so readily decomposable by acids as the ordinary limestones. All carbonates are, however, decomposed ultimately by even weak acids, so that they are far from imperishable, especially in large towns, although the physical conditions of some qualities will frequently enable them to resist disintegration far longer than another variety having precisely the same chemical composition.

Slate, shales, &c., are mainly composed of clayey material (impure silicate of alumina) that has been hardened by enormous pressures acting in particular directions.

Granites, which are crystalline rocks of the old formations, as a rule consist of irregular mixtures of three minerals, felspar, quartz, and mica. A variety, known as syenite or syenitic granite, contains, instead of mica, hornblende The granites are largely used, many sorts being very ornamental, hard, and durable. Even

* *Cornhill*, vol. ii., p. 709.

this variety of stone undergoes decomposition in some circumstances: thus, although in a favourable climate like that of Egypt, granite obelisks have weathered successfully the storms of 2,000 years, the same rapidly show signs of deterioration in the atmospheres of New York and London.

The variety of felspar found in granite is orthoclase, a compound containing potash, alumina, and silica, and this is probably the weak point in the composition of the stone. Moreover, in moist climates granite surfaces are apt to become, according to M. Robert, the *habitat* of a minute cryptogamic plant, which decomposes the stones in order probably to obtain the supply of mineral matter necessary for its own nourishment.

It has, at various times, been more or less authoritatively stated that lichens which form frequently on stone surfaces in country places help to preserve such stone, but this idea is not supported by any reasonable argument. The lichens do not thrive in acid town atmospheres, which are likewise destructive to stonework, but it by no means follows that when lichens do cover the stone they conduce to its preservation. The greater probability is that the stone would last better if kept free from such growths, which requiring, as they do, mineral matter for their sustenance, obtain such matter chiefly by the decomposition of the surfaces upon which they reside; especially is this true of the lichen, *Lepra antiquitatis*, which has been described as "one of the worst enemies of stone."

This subject, however, requires and deserves further investigation, and if any readers of this summary of an important question are inclined to place at the author's disposal specimens of stone upon which may be growing lichens, mosses, fungi, or other cryptogamic plants, together with all possible information as to the position, circumstances, &c., in which the specimens were found, he will be glad to examine the same and to point out appearances, &c., that may tend to prove or disprove the theory that such growths are harmless to stone on which they develope.

Position in a building often has much to do with the longevity of stonework. The harder material should, so far as possible, be placed on the most exposed sides, in this country generally south, south-west, and west. The wind and driving rain are the chief causes of the mischief, though a strong wind laden with sharp, gritty dust will also in time obliterate inscriptions, tracery, &c., in the hardest stone.

The following are the devices, patented and otherwise, good, bad, and for the most part indifferent, or, at any rate, imperfect, which have been brought before public notice with the idea of securing the object that forms the title of this article.

To obtain immunity from the growth of lichens, &c., numerous sterilising concoctions, such as those containing copper compounds, have been suggested; but these are of little importance.

A large proportion of the patented preparations consist of varieties of more or less perishable paints and varnishes, which protect the stone for just so long as they themselves remain perfect and impervious. Disregarding ordinary paints and similar preparations, we will briefly enumerate the various compounds which have been patented, and which contain some proportion of animal or vegetable material,—of course, all such substances, and nearly all other paint-like compositions, are inadmissible for most stonework, especially of an ornamental character, hiding as they do the natural colour of the stone, and clogging and destroying the sharpness of designs, &c. Still, there are conditions where such substances as some of the following may be usefully employed.

In 1847 W. Hutchison patented a mixture of rosin, pitch, and similar matters, mixed with oil and powdered stone, slate, or chalk.

B. Barrett suggested, in 1853, a process which he deemed specially applicable to the more porous stones and cements. The stone was to be placed in a chamber from which the air was exhausted, and one or another of the following indurating mixtures allowed to flow in; or, in some cases, where exhaustion was not practicable, the mixtures might be applied like ordinary paint. No. 1 contains resin dissolved in turpentine, naphtha, or spirits of wine, mixed with gutta-percha dissolved in coal-tar naphtha, and while still warm, oil of some sort is added. No. 2 consists of gutta-percha dissolved in coal-tar. No. 3 contains shellac, Venice turpentine, &c., dissolved in spirits of wine or turpentine. No. 4 is made up of unslaked lime and soft soap; Russian tallow is added while the lime is slaking, and the whole is subsequently placed in a copper with alum, water, sulphate of iron, and "solution made from potatoes and beer settlings"! Other mixtures are also mentioned in the specification, containing sulphur, gutta-percha, &c. The latter seems to be regarded by some patentees as the *beau ideal* of an imperishable substance, but the author's experience by no means bears this idea out. A few years ago he was handed some ornamental mouldings made from pure gutta-percha about thirty years since, and which were riddled through and through with minute holes, apparently the work of some insect, the holes being filled with a fine, dry, brownish powder. It is well known, too, that, in hot climates especially, the gum oxidises after a time and becomes useless.

Assanti (1854, pat. 427) uses gutta-percha dissolved in carbon disulphide. Another patentee uses the same substance, as well as other gums, dissolved in naphtha. An attempt was made in 1853 to obtain a patent for impregnating natural and artificial stone by immersion in cauldrons of melted resinous and bituminous substances; the idea being to utilise the pressure of the supernatant fluid for forcing the same into the pores of the stones, a depth of at least 12 ft. of the melted substance was recommended.

G. Winspear in the same year patented the application of varnish and pulverised mineral matter to protect metallic and stone surfaces, which were first to be coated with any ordinary varnish, and while yet moist, Roman cement was to be applied by means of a blast of air. The cement might be combined with calcined oyster-shells or other preparation of lime, and the coatings of cement and varnish might be several times repeated. For interiors, pounded glass, ground flints, and even borax might be employed.

More recently (1886, No. 4,872) a plan has been patented somewhat similar to Winspear's apparently, except that the powders used are of greater variety, and include powdered sandstone, freestone, brick, terra-cotta, granite, onyx, marble, &c. These are made to adhere to the surface with paint or varnish.

In 1856, another inventor recommended that the stone should be just coated with a solution of gelatine, glue or similar matters, and then when dry the gelatinous matter was to be rendered insoluble with tannic acid; or silicate of soda or potash might be applied. So-called "anti-nitrous cements" were patented in 1858 by Candelot, which were also applicable for rendering damp surfaces impervious and for the preservation of stone. They consisted essentially of a liquid containing boiled oil, rosin, turpentine, wax, stearine, and liquid india-rubber, and of a powder containing glass or silica, chalk, oxide of zinc, sulphur, or talc and pulverised slaked lime. The powders are well mixed and sifted and when added to the liquid for use form a hard and quickly-drying cement, which can, while still semi-fluid, be applied with a brush to walls, stonework, &c. Another patent in the same year, which obtained provisional protection only, was for the special purpose of rendering plaster of Paris harder, and for the prevention of efflorescence on walls, to which such plaster was to be applied. For the first purpose the plaster was mixed with water containing hydrochloric acid and American potashes (which would result in the production of a solution of chloride of potassium); this causes the plaster to set slower, but harder. To prevent efflorescence the following mixture was to be applied to the walls:—Arsenic (by which is presumably meant the oxide, commonly termed arsenious acid), half a pound; hydrochloric acid, half a pint; sulphuric acid, one gill, mixed with one quart of milk, and three or four gallons of water. In 1861 a protective paint for stone was patented by W. Smith, which was made up of powdered flint, or other silica, with alum or sulphate of alumina, the mixture being formed into a paint with dissolved glue, bituminous substances or linseed oil and turpentine. About the same time another paint, which was also to be used with linseed oil, was brought out as being specially applicable to plaster surfaces. The dry basis of the mixture was made up of powdered slag, borax, white lead, sulphate of alumina, acetate of lead, sulphate of zinc, silicates of soda and potash, and kaolin; sufficient water was first added, and then the linseed oil. An oily compound, patented in 1863, for preserving stone, was made up of one gallon "of any oil," and one gallon of water, to which was added two pounds of nitre, salt, or soda, mixed or separate, and two pounds of dissolved sulphur. Another patent of doubtful utility obtained in the same year was for a mixture made up of animal gall, limewater, and "liquid from boiling potatoes": this was called No. 1 solution. No. 2 consisted of a solution of sulphur and camphor obtained by the use of a combination of mineral and linseed oils. Before applying the mixtures it is directed that the stone should be cleaned first with an alkali, and then with an acid, and after being well washed with clean water, No. 1 solution is applied, to be followed by No. 2.

We will refer to some other preservative processes in a second article.

MILAN CATHEDRAL.

COMPETITION FOR NEW WEST FRONT.

IT will be remembered that the Administration of the Duomo at Milan issued in the early part of last year a programme inviting architects to send in designs for a new west front. It was induced to do so in consequence of a considerable sum of money having been left it for this purpose by a citizen of Milan under certain conditions.

The problem of improving the west front seems to have excited the greatest interest amongst Italian architects for many generations, and numerous projects with this object in view have been from time to time prepared, and are now in the hands of the Administration.

The question has lately assumed increased importance in the opinion of the Milanese, from the fact that the new buildings surrounding the Piazza have considerably dwarfed the Duomo.

The competition has resulted in the exhibition of 126 designs, five or six of them, at any rate, being English; the rest for the most part, German and Italian. Some of the latter are drawn to an immense scale, and are illustrated in a lavish manner unknown to English competitions. They have been on view for some weeks in the galleries of the Brera, and have attracted great attention. On Tuesday, the 24th ultimo, the exhibition closed, and the day following the jury held its first meeting, presided over by the Marchese Carlo E. Visconti. Amongst the members of the jury Baron Schmidt represented German architects and Professor de Dartein the French. After many conferences, the jury reduced the number of designs to twenty-six, and finally (after bringing the twenty-six into juxtaposition for more critical comparison) to fifteen, the authors of which are the following:—

Daniel Brade, 5, Bridge-street, Kendal.
Ludwig Becker, Mainz.
Morelli Gaetano, Milan.
Antonio Weber, Vienna.
Hartel-Neckelmann, Leipsig.
Rodolph Dick, Vienna.
Giuseppe Brentano, Milan.
E. Deperthes, Paris.
Teodoro Ciaghin, St. Petersburg.
Luca Beltrami, Milan.
Tito Arrolini, Bologna.
Enrico Nordio, Trieste.
Carlo Ferrario, Milan.
Paolo Casebianche, Milan.
Giuseppe Locati, Milan.

These names are given, not necessarily in the order of merit, but in the order in which they were hung in the galleries.

The authors of the fifteen designs will now proceed to compete again, the prize adjudged to the victor being no less than 40,000 francs, smaller sums being distributed to the other fourteen, three of 5,000 francs, three of 3,000 francs, and the rest of 2,000 francs.

The designs for the most part suggest the heightening and accentuation of the front. Some of the designs have lateral towers and spires. Of these, probably the best are those which are kept decidedly subordinate to the existing central spire, though there are others which are carried to a much higher elevation than it, so as to change entirely the character of the structure.

Several designs afford interesting examples of an open porch of the Peterborough type.

The nationality of the architects is very marked, both in the character of their designs and their draughtsmanship; the French and German drawings being, as a rule, very carefully delineated and shaded with the pen, and show excellent knowledge of detail in many cases. The Italian designs are full of chiaroscuro and dash, with less care for detail. One Italian design, that of Luca Beltrami, attracted great attention. In it the author has collected the admirable Renaissance portals and windows of the present west front, and introduced them into a campanile in a design of great merit. This campanile he proposes to erect in an isolated position on the south-west of the Duomo, immediately opposite the central arcade of the great Galleria. The difficulty of disposing of these beautiful cinque-cento features seems to be found the great crux in any attempt to improve the west front of the Duomo.

A. WATERHOUSE.

NOTES.

IT appears that M. Bouquet de la Grye, in his report to the French Academy of Sciences in regard to the Panama Canal, has expressed the opinion that the construction of locks on the canal would be quite useless, and that it is impossible that there can be any difference of level between the Atlantic and Pacific. So most of us would suppose; but it seems odd that there should be any conflict of opinion about such an easily-demonstrable matter as the sea-level at either end of a canal route, if there has been anything like a proper survey. There remains the further question, however, whether the raising of the canal level by locks is not a necessary condition of carrying out the work at all; a matter on which it would be impossible to come to a decided conclusion without seeing the section of the route.

WE have received a copy of a lecture given at the Hôtel Continental at Paris two or three weeks ago by M. Gustavo Guzman, in favour of a scheme for a canal from the Atlantic to the Pacific through the Nicaragua State, and by utilising the Nicaragua Lake as part of the passage. M. Guzman avers that the river San Juan, with a little treatment, will afford the passage from the Atlantic to the lake, leaving only a short canal to be cut from the lake to the Pacific at the port of Brito. According to his report the rise of the ground is only 14 mètres, and the canal can be worked with four locks. It is rather amusing to find that while, as observed in the foregoing note, it has just been reported that locks on the proposed Panama Canal are all a mistake and quite unnecessary, we have here another report, from a writer professedly knowing the ground, to the effect that there is hardly a place in America where a canal is possible without locks. As to the Panama Canal, no words of scorn, pity, and contempt seem sufficient to express M. Guzman's feelings in regard to that project, of which his own is an intended rival, which he refers to as the "*prétendu* Canal du Panama," with defiant italics, and against which he quotes the opinion of an eminent engineer, "sir John Haukskow," whose name is not familiar to us. However, says M. Guzman, "La France, heureusement, est assez riche pour payer au prix de milliards l'erreur d'un de ses plus illustrés enfants," and she will be rewarded for her disappointment and disbursements by the achievement of the Nicaragua Canal when the requisite funds are raised.

"A WOULD-BE COMPETITOR," who is now apparently "a won't-be competitor," has sent us a copy of the instructions issued to architects who may wish to compete for laying out a new cemetery, with mortuaries and other buildings, for the borough of Oldham, accompanied by much stringent and indignant criticism. Some of the points objected to by our correspondent are unfortunately common to nearly all competitions, *e.g.*, that the premiated designs are to remain the absolute property of the Corporation. This generally-accepted condition is most unfair to the Profession, when (as is usually the case) the highest premium only amounts to a sum far below the usual 2½ per cent. commission on buildings designed, but not carried out, by the architect; but in this respect the Oldham Corporation are no worse than their neighbours, and their premium,—60*l.* for work to cost 5,500*l.*, is higher in proportion to the work than in many cases. But one point about the "conditions" is open to strong objection. The competitor is to "state what commission he will charge if engaged to supervise the works": a request which is very much at variance with any proper idea of the dignity of the profession, and which in reality amounts only to a kind of premium to inferior people to cut in and do the work cheap. What would be thought by lawyers (or indeed by the general public) of a Corporation which sent round invitations to solicitors to say for what charge each of them would undertake the legal business of the Corporation? It would be considered an almost disreputable thing to do. And why are architects to be treated worse?

AFTER long years of consideration, the borough of Ramsgate has resolved to attempt to carry out the formation of a roadway to unite the East and West cliffs. This roadway will start at the Royal Hotel, facing the harbour, and will rise by a uniform gradient to the Smack Boys' Home, in front of Prospect-place. The roadway will be formed on a viaduct, and the arches beneath the road will be utilised as stores. A portion of the inner harbour, and some unimportant property in the neighbourhood of the harbour, are proposed to be taken, and eventually it is intended to acquire the Albion Hotel at the foot of Harbour-street, so as to afford a continuous roadway to the East Cliff by way of Albion-place and Wellington-crescent, but this latter proposal, we believe, forms no part of the present scheme. The cost of the works is estimated at 15,000*l.*, exclusive of compensation. Most of the property likely to be affected belongs to the Board of Trade, and the Town Council are sanguine that they will be able to effect a satisfactory arrangement with the Board with regard to their property. The proposed improvement will go far to destroy the picturesque appearance of Ramsgate from the sea, and appears to offer but few compensating advantages. The elevation of the viaduct towards the harbour is a monumental example of the misapplication of design, and it is to be hoped that it will not be carried out.

A PAPER on "The Signs of old Lombard-street," originally read by Mr. F. G. Hilton Price before the Institute of Bankers, has now been published* in an edition *de luxe*, making a thick and handsome volume mainly occupied with illustrations of the old signs, taken from authentic sources, and shown with wrought-iron supports, which, although not the actual supports of the sign-boards in question, are copied from work of the period or from drawings. In some cases wooden supports or brackets are shown. A comparison of these with the wrought-iron open ornament which surrounds some of the other sign-boards shows very clearly how the apparently rather unmeaning curves of the wrought-iron work, in some cases, arose from the attempt to line out in outline, in thin iron, the curves of the features carved in other cases in solid wood. This will be quite evident on comparing the iron framework of the "Blew Anchor" sign with the wooden framework of the "Black Lyon" sign which immediately follows it. Among the more characteristic of the signs figured are the "Three Feathers," not treated as in the present Prince of Wales emblem, as springing from a central point and the outer ones falling over to right and left, but three parallel feathers, very conventionally cut, and each with a bend to the right at the top; the "Royal Oak," with a head and three crowns grouped around the foliage of a tree (this house, a tavern, is mentioned by Pepys): the "Three Crowns," artistic in effect, and with a curiously designed suspending bracket; and the "Royal Exchange," with a picture of the Old Exchange on the signboard. After the Great Fire, Mr. Price observes, many of the signs were carved in stone, and built into the fronts of the houses; but the habit of hanging them or planting them in front was gradually renewed, and between 1760 and 1770 most of them were removed by order. It is curious to find the fashion of signs coming in again to some extent, though it is for the most part only among those who have special artistic or archæological tastes, and is not likely to become so general as to be an inconvenience. Those who have an inclination in that direction will find a great many models for the (archæologically) correct thing in Mr. Price's book, which, in other respects, is a truly desirable volume, with thick paper and wide margins, and altogether a handsome addition to an archæological library.

* London: Field & Tuer, and Simpkin & Marshall. New York: Scribner & Welford.

ON the 15th of June next will be offered for sale, at the Auction Mart, one of the most beautifully-situated residences in Ireland. It is Rostellan Castle, the seat of the last Marquess of Thomond, and occupied since his lordship's decease by the late Mr. Wise. Overlooking the Cove of Cork, a favourite yachting station, and with some finely-wooded country to the north, the castle was rebuilt in the early part of the seventeenth century. The park extends over 1,200 acres. The property furnishes good trout-fishing and wild shooting, and includes some farm buildings, together with residences for keepers and bailiffs, and other outdoor servants. The land is reputed to contain some seams of silicious clay, and productive veins of hæmatite ore. A ridge of limestone rock traverses the park.

AMONGST other properties also for sale, in England, we may instance the Barcombe House estate, on the Ouse, near to Lewes; the Oakeley estate, Shropshire; and the Franks property, in the Vale of Darenth, within a mile of Farningham railway station, in Kent. The last named carries with it an historic mansion, of whose antiquarian features an illustrated catalogue is being prepared. The Shropshire property has been held by the Oakeley family for several generations past. It lies by Bishop's Castle, to the north-west of Ludlow, and is not far from Hay Wood Forest, in which were benighted the children of Lord Bridgewater, President of Wales, who afterwards, on Michaelmas night, 1634, performed at Ludlow Castle Milton's "Masque of Comus." The mansion-house, and another residence known as the Roveries, together with thirteen farms and 3,000 acres of cultivated and preserved land, are estimated to yield a rental, in all, of 4,000*l.* a year. The freehold comprises the advowson of Lydham, which is worth about 400*l.* per annum.

A HIGHLY-PRACTICAL and solid memorial to the late Earl of Shaftesbury has just been established in Charles-street, Westminster Bridge-road. It is in shape of a new ragged school, designed to carry on the functions of one in Jurston-street, wherein that great philanthropist is said to have first entered upon his conspicuous share in ragged school work. The foundation stone was laid

by the Rev. Newman Hall on the 1st of June current. The schoolrooms, with two class-rooms, having accommodation for 350 children in all, will cost not more than 1,000*l.* Rowland Hill laid the memorial stone of the original Jurston-street school in 1817. That building, however, was taken down some years later, and the school, augmented by another one, was removed into premises that had been popularly known as the "Penny Gaff" in the New-cut, Lambeth.

THE recent decision of Mr. Justice Stephen in the case of Blake *v.* The Land and House Property Corporation (Limited) appears to be scarcely legally sound. A cistern of the defendants, who were the owners of the premises above those of the plaintiff, overflowed, and by this overflow the plaintiff's property was damaged. The cause of the overflow was that the lid of the cistern was so arranged that the ball-cock would not act properly, and that the tap being left turned on the water could not flow away in its proper channel because the escape pipe was stopped up by a piece of rag, a piece of earthenware, and two small cinders. Mr. Justice Stephen decided that there was no evidence that there was negligence on the part of any one for whom the owner of the premises was responsible,—in one word, that there was no negligence on the part of the defendant. Greater negligence than was disclosed in the management of the cistern could hardly be proved, for there were three distinct acts of negligence. If this decision is sound, what becomes of the elementary legal maxim that a man is to manage his property so as not to injure that of his neighbour? There is hardly any act of negligence which may not be the work of a malicious person, but until the person responsible for that negligence proves that it is caused by such a third party, who is not his servant, in every principle of law he is liable for the consequences. We hope this decision will be reversed by the Court of Appeal.

THE Edinburgh Architectural Association have collected into one handsome volume the contents of their Sketch-book from 1883 to 1886. The contributors of the various sketches have added some notes, which add to the interest of the work. A large proportion of the plates consist of measured drawings, and many of these are of a very high order, both in regard to execution and to the interest and beauty of the work illustrated. In the preface Mr. Gordon, the editor, mentions that the attention of members was some time ago directed to the fine plaster ceilings which remain in a few of the old Scottish mansion-houses, and a good many of these are carefully illustrated in the plates, and are well worth it; those from Pinkie House, and from Bailie MacMorran's house in the Lawnmarket, are especially noticeable. The latter is a panelled ceiling of rather unusual design (sixteenth century), and with some charming floral ornament in the centre of the panels, of which larger-sized details are given: the drawing is by Mr. J. H. Cooper. The drawings from Elgin Cathedral, and from the tomb of Bishop Dunbar in St. Machar's, Aberdeen, by Mr. Jas. C. Watt, are exceedingly good; these were placed first in the competition for prizes offered by the committee. Mr. Watt's admirable illustrations of the chapel and tower of King's College, Aberdeen University, we had the pleasure of publishing some time since. The decorative details from the ceiling of the Roman Eagle Hall, Lawnmarket, are very singular and graceful, and well worth attention (no signature is appended to the drawing). The ceiling of the drawing-room at Winton Castle, by Mr. Baillie, is another very fine example; this is a panelled ceiling of very rich design, and here, as in other examples, the decorative details are very curious and interesting, and different from anything of the same date that is usually found in England, showing a type of floral ornament which combines conventional arrangement of sprays with a great deal of realism in detail. Mr. J. N. Scott's drawings of the massive architecture of Jedburgh Abbey are equally good in the measured geometrical drawing and in the small but beautifully-executed perspective sketch of two bays of the arcade, which is about the best bit of free sketching in the book. In general, the perspective sketching, of which there is not a very large proportion, is not the strongest part of the publication, being, in some cases, rather too scribbly in style, and in others, as in "Dunning Castle" and "Midcalder Church," rather too tame and mechanical. That of the gallery in the transept of Pitsligo Church, again, is overloaded with line-shading. The entrance doorway and details from Huntly Castle, by Mr. F. W. Troup, are very interesting, containing very singular details, and a curious mixture of Gothic and Renaissance feeling. Altogether, the Edinburgh Association is to be congratulated on the general merit and interest of the volume, and the exceedingly good work in not a few of the plates. The details of the old ceilings alone would make the book worth possessing; they are full of hints which might be worked out further when opportunities present themselves.*

IN the last number of the *Jahrbuch des Kaiserlichen Deutschen Archäologischen Instituts*, ii., 1 (1887), Dr. F. Dummler, of Halles, publishes the fragment of a vase which, if his view be correct, casts an interesting light of a Homeric epithet. In the catalogue of the ships ("Iliad II.," 542) we are told there came to Troy "Elephenor . . . . captain of the proud Abantes, and with him followed the fleet Abantes *with hair flowing behind* (ὀπισθεν κομόωντες). Helbig ("Homerische Epos," 163) takes this simply to mean that the hair flowed abundantly behind, and as no nation, at least, no warlike nation, in their senses, would be likely to endure the inconvenience of their hair flowing freely in front, this amounts to little more than the usual epithet κάρη κομόωντες, with flowing hair, applied to all the Achæans,—such an arrangement as is frequent on the so-called "Apollo" statues. The scholiast takes the phrase as having a much more precise intention. Hair flowing behind means flowing behind and *behind only*. The source of this particular tradition seems to be Archemachus, of Eubœa. He, according to Strabo (book x., 465) says that "the Curetes had their settlement at Chalcis, but, being continually at war about the Lelantian Plain, and finding that the enemy used to seize and drag them by the hair of the forehead, they wore their hair long behind and cut the hair short in front, whence they had the name of Curetes, from κουρά, the shearing they had undergone. This has the air of an aetiological myth, but possibly some one learned in savage lore may be able to parallel the precaution. Plutarch confirms the early interpretation, and adds that Theseus, when he came to manhood, shaved only the fore part of his head, after the manner of the Abantes, and, he adds, this form of tonsure was called after him Theseis. Dr. Dummler's vase fragment gives a good monumental instance of the Theseis. On it is painted in very archaic style the head of a man. He is beardless; the front of the head is carefully shaved while behind falls a thick mass of hair gathered behind the ears into a spreading mass. This form of tonsure, if safe, is not becoming; but, after all, then as now, "il faut souffrir pour être beau."

THE *Gazette Archéologique* (1887, 1, 2) publishes an interesting vase from the Campana collection of the Louvre, with the rare subject of the blinding of the giant Polyphemus by Ulysses. Polyphemus is recumbent in his cave. Two men approach him with a burning stake which they are about to thrust into his eyes; the flames at the end of the stake are carefully painted red. A third man, distinguished by a sword, and probably Ulysses, is heating a second stake at a fire. The vase is a black figured oinochoë. Only four other instances of this subject are known, of which, perhaps, the most interesting, and certainly the most barbarous, is that in the Bibliothèque Nationale at Paris, in which Ulysses presents a cup of wine to the Cyclops at the same moment that the blinding is about to take place. A second instance is in the Capitoline Museum, and is signed with the name of the potter Aristonophos. A third and fourth, of less interest, are in the Berlin and the British Museums. The newly-published vase is decidedly the finest work of all.

* The present volume, we should observe, forms Vol. I. of a "New Series."

THE *Times* of Friday last week published a description of the micro-telephone patented by Dr. Cornelius Herz, a small but highly sensitive instrument, calculated to serve short distances at less cost than the ordinary telephone. As described, the visible portion of the instrument does not occupy much more space in a room than the shield of an electric bell. "There is a button to be pressed which causes a bell to ring. When the person at the other end touches the button there, the two are prepared to converse. In order to do this, the shield, which forms the receiver, and is attached to the instrument by a wire of any desired length, is removed from the wall and applied to the ear; the part exposed is a disc of carbon, and any sound uttered at or near it is conveyed to the opposite extremity. There is no need to remain close to the disc; on the contrary, one may remain a yard away from it, and speak in an ordinary tone of voice at that distance." It is remarked that this will be a very suitable instrument for household purposes, giving orders to servants from one room to another, &c.; but it appears to us that it will do nothing in that case that a speaking-tube will not do better, and at less cost. In speaking over rather longer distances, as from a house to the lodge or the stables, such an instrument may, no doubt, be very useful.

IN the *Asclepiad*, Dr. Richardson publishes an essay on "Winter Palaces of Health," suggesting the idea of having blocks of residences in various suitable localities built around a glass-covered winter-garden:—

"Each of these houses should be divided into an upper and lower flat 60 ft. deep from the front, 25 ft. wide, and fitted with every convenience for the residence of an invalid, and with every room and part at equable and adjustable temperature. The two sets of flats, upper and lower, numbering say one hundred altogether, would accommodate comfortably and luxuriously that number at least of sick people, with all necessary attendants and friends. On the roofs of these flats would be four galleries or terraces, covered in glass and laid out with flowers, each gallery twenty yards wide and upwards of one hundred long, in all a promenade round of nearly a quarter of a mile. The square, covered at a grand height with an arch of glass, like the Crystal Palace, would be the inner garden, kept always at equable temperature."

This is for the benefit of those who are ordered to winter in a warmer climate, and for one reason or another cannot go. We fear, however, that to make these Palaces of Health remunerative, a rent would have to be charged which would make the expense nearly as great as that of going abroad, and we should very much doubt finding people very forward to embark money in the speculation; though it is, no doubt, a perfectly possible expedient, apart from the financial question. We should imagine, however, that a winter would be rather dull in a "Palace of Health."

ARCHITECTURE AT THE ROYAL ACADEMY.—VII.

1714, "DESIGN for a Pianoforte Case," Mr. L. Alma-Tadema, R.A. A sheet of beautifully-executed coloured geometrical drawings of the pianoforte case designed by the artist for an American client, and which we have already described from the original when shown at the makers', Messrs. Johnstone, Norman, & Co. Careful as the drawings are, however, they do not convey an adequate idea of the effect of the work itself. It may be observed, in addition to our former remarks, that the inlaid wreaths on the lid, enclosing the names of the Muses, are all varied in design, and show some charming bits of decorative detail. The employment of two mimic Doric columns for the pedal rest is the only detail we should be disposed to criticise; it is hardly in place, and looks thin and hard in comparison with the

remainder of the work; but painters do not feel this, of course, in the same way that architects do.

1715, "Alterations and Additions to a Cottage, Haslemere," Mr. W. A. Pite. A small geometrical elevation of a pretty and picturesque cottage, shaded in Indian ink, with a semi-pictorial effect, very successfully.

1716, "Design for a Stained-glass Window: Woman healed by Touching our Lord's Garment," Mr. Ion Pace. An upright circular-headed compartment, with a well-designed and effective border; the arch-head is filled up with armorial bearings on a diaper ground, of small quarries. The centre portion is occupied by the figures of Christ and the woman and bystanders,—a well-designed and expressive group. The upper portion is occupied by rather too realistic trees, and part of a hill and castle, with a deep blue ground representing the sky; this is too pictorial for glass. If the trees had been conventionalised into a decorative form, and the "hill" omitted, it would have been more satisfactory from this point of view. Two angels on either side of a tomb or altar, with a background of cinque-foiled semicircular arches, form a predella, graceful in effect, but of which the meaning is not very apparent. Altogether, however, this is a very refined little design.

1717, "Speldhurst Lodge, Kent," Mr. Mervyn Macartney. An effective monochrome sketch, representing a long run of half-timber walling, interrupted by a massive brick chimney-stack, and butting against a square block of stone building: very picturesque in effect, but, like some other drawings in the room, suggesting the question whether this is a sketch of an ancient house or a design for a modern one. If the latter, a good deal of pains has been taken to make it look grim and dilapidated.

1719, "Alternative Design, Newcastle Cathedral West Window," Mr. E. Frampton. This is not, we believe, quite correctly called "alternative design"; it should be "design submitted for," &c., as another artist has the commission. It consists of two lights, each with a single figure. St. Nicholas in the one, and the Venerable Bede in the other; the figures are treated with true feeling for decorative effect; the lower portion has a light diaper background, the heads stand out against a dark crimson ground, with a label with the name forming a semicircle, aureole-wise, round the head. The rest of the space is filled up with tabernacle work of a kind commonly employed in Gothic windows, ancient and modern.

1720, "Enlargement of Kew Church, Exterior, looking West," Mr. Henry Stock. A good water-colour drawing, hung high. There is nothing, however, to show in what the "enlargement" consists, and we have not at the moment a sufficient recollection of the church to appreciate the treatment of it shown here. A small plan, with the added portion coloured, would have rendered this plain.

1722, "Church for Rogerstone, Monmouthshire," Mr. T. M. Lockwood. Another view of the church, shown in No. 1690. A good-enough simple Gothic church, but with nothing whatever in it to justify its being illustrated twice over. It is obviously hung simply for the drawing. That is not the principle on which drawings ought to be hung in the architectural room at the Academy. The conclusion to be drawn is that if an architect can only succeed in catching a particular draughtsman who has evolved an effective method of tinting he may get as many illustrations of a commonplace design hung as he likes to send. This is capital for the draughtsman, who ought to make a good market out of it, but it is not in the best interests of architects or architecture.

1723, "Dovenby Hall, Smoking-room," Mr. C. J. Ferguson. A water-colour drawing of a pleasing wainscoted Jacobean interior with a panelled plaster ceiling. To speak correctly, it is not so much a water-colour drawing in the proper sense of the words, as a line perspective subsequently tinted. The curves in the niches, by the way, are not all true in perspective.

1724, "The Pavilion, Charterhouse School," Mr. Ralph Nevill. A cricket-field pavilion of considerable dimensions, a single-timber construction, chiefly noticeable for the entire absence of the gimcrack kind of ornamentation which such structures too generally display.

1725, "Mansfield College, Oxford: South View," Mr. Basil Champneys. A view showing the square gate-tower, with a range of residential buildings, we presume, on either hand abutting against it, and the chapel on the right. The chapel has the ante-chapel, forming a kind of transept across the end of it, which is recognised as the orthodox accompaniment of a college chapel; an octagonal turret is effectively placed at the re-entering angle of the chapel and ante-chapel. The buildings are of late Gothic style, and exhibit a traditional collegiate cast of architecture. It is impossible to judge without a plan, but we should imagine that some of the rooms must be insufficiently lighted, however picturesque may be the effect of these small windows in a wide expanse of wall.

1726, "New Houses, the Beach, Walmer," Mr. James Neale. A large and effective pen drawing; the houses, while preserving a certain similarity of general idea, are effectively varied, but they still retain a little too much of the "watering-place villa" style, which is, in fact, the most unsuitable style for buildings by the seaside. A shore house should above all things appear solid, strong, impervious to wind and weather. These are lake houses rather than seaside houses.

1727, "Redesdale Hall, Moreton-in-Marsh," Messrs. Ernest George & Peto. This is apparently a public hall or market hall for a small town, with an open ground-story carried on massive piers and three centred arches for the walls, and with thick wooden story-posts and brackets under the floor-beams. The style is of very late, or what in the orthodox days used to be called "debased" Gothic (nothing is "debased" now!). The humour of making the lower lights of the two end windows very short, with two tiers of long lights over them, is noteworthy, and adds a good deal to the character of the design. We may notice at this juncture the other drawings exhibited by the same architects. No. 1731, "Glencot Wells," is a specimen of an Elizabethan house of the quietest type, with no decorative expression but what is derived from the placing of the mullioned windows and the string-courses, with a terrace in front showing a balustrade of later tendencies, with ball finials; one or two deep recesses give a strong shadow here and there. No. 1737, "Dunley Hill, Dorking," is an imitation of the architecture of a later date, and what would once have been called "debased Classic." A plan is appended to this. Both these are very picturesque in general arrangement and grouping,—"Glencot" particularly so,—and the admirable brown ink drawings in which they are shown add very much to their charm; drawings which are touched with an artist's hand, not overworked or over-shaded. One cannot but remark, however, that in both cases the charm is mainly due to the revival of the features and manner of the architecture of a past generation; they look exactly like old houses of the seventeenth and eighteenth centuries, and whatever may be the charm of this, it is based on a false sentiment, which will not be permanent, and when the taste for this type has passed away, the charm will be dissolved. A real eighteenth-century house is one thing; a nineteenth-century imitation is another. This remark applies less, however, to No. 1741, "Albemarle Hotel, Piccadilly," for though the details here are all old, the combination of them shows so much effect and originality of grouping as to give a novel interest to the old features: the separate range of windows close under the cornice, for instance, with its little order of baluster-pilasters, is a very pretty incident in the design. This, like the others, however, owes something to the drawing, which gives it the effect and texture of an old building in keeping with the old details; and this source of charm also must vanish when the building is seen as a new structure. Mr. Ernest George has so much faculty for picturesque grouping and treatment of building, that it is to be regretted he should not employ this more in giving interest to buildings of more modern and more original detail, instead of producing what appear to the eye to be charming sketches of old town and country buildings of various dates.

1732, "Warehouses over the former Site of St. Paul's Schools, St. Paul's Churchyard," Mr. F. Hemmings and Mr. Delissa Joseph. This is a large and well-executed pen drawing of the range of buildings opposite the east end of St. Paul's, about the building of which there was a good deal of correspondence in the papers some time ago as to the advisability of setting back the street line and leaving more space around the Cathedral, instead of crowding it up anew with buildings after the demolition of the old St. Paul's Schools. The architects seem to be of the same mind, as they have sent in a view which is entirely illusory, and represents their own buildings as they never can be seen, and the angle of the Cathedral on the left a great deal further west of them than it really is. The semicircular sweep of the buildings is effective in the drawing, but they are entirely without interest architecturally.

1734, "University College, Aberystwith," Mr. J. P. Seddon. This is a large drawing of Mr. Seddon's picturesque and poetic building, erected many years ago, but there is nothing said as to the reason for exhibiting it now, nor whether it represents any addition to or reconstruction of the building, which was not long since to a great extent destroyed by fire: so we presume we are to take it merely as a representation of the building as it existed. In that sense it is of value.

THE ANNUAL REPORT OF THE METROPOLITAN BOARD OF WORKS.

THE Report of the Metropolitan Board of Works for the year 1886 has only just been issued, although it is dated "Spring Gardens, 31st December, 1886." Why a document of so much interest to the long-suffering metropolitan ratepayer should make so belated an appearance we are not told, nor can we conceive a sufficient reason for the delay. It is true that there are several appendices to the Report, containing statistical and other information, but there is nothing to show why this information should have taken about five months to prepare. Two of the appendices, Nos. 2 and 3, consist of the Reports of the Engineer and Superintending Architect* respectively, but both these documents are dated "31st December, 1886."

Under the head of "Sewerage and Drainage," the Report of the Board alludes to the progress made in the construction of relief sewers supplementary to those of the existing main drainage system. These include new sewers from Putney to Clapham (cost 151,995*l.*), the Holloway and Northern High Level Relief Sewers (cost 78,500*l.*), the Queen's-road, Dalston, sewer (cost 19,850*l.*), and a small pumping-station in the Isle of Dogs (cost 6,100*l.*). Some of these works were completed, and others well advanced towards completion, at the date of the Report.

The next section of the Report deals with "The Sewage of the River Thames," but it does not contain any particulars with which our readers are unacquainted. The subject is, however, more fully treated of in the Engineer's Report.

From another section of the Report we learn that the operations of the Board under the Metropolis Management (Thames River Prevention of Floods) Amendment Act, are practically completed. The Act, it will be remembered, empowers the Board to require the wharf-walls and banks of the River Thames within the metropolis to be so raised as to prevent the overflow of the river within the limits of the Board's jurisdiction.

Under the head of "Metropolitan Improvements" the completion or progress of several important new Metropolitan thoroughfares is reported. Among the completed works of this description the most important are the new street from Tottenham-court-road to Charing-cross, and the new street from Oxford-street to Piccadilly-circus. One of the most important street improvements now in progress is the new street from Gray's Inn-road to St. John-street-road, which will afford a long-needed and greatly improved line of communication between Holborn and Islington. The new street, starting from the junction of Gray's Inn-road with Clerkenwell-road, will run in a north-easterly direction, and, for the purpose of avoiding the bottle-necked and declivitous Elm-street and the wider though not less declivitous "Mount Pleasant" and Coldbath Fields, it will, for a distance of about 120 yards, be carried on a viaduct, crossing Great Warner-street with a headway of 18 ft. The new street will then cross Tysoe-street and Garnault-

* The Superintending Architect's Report, signed by Mr. John Hebb, the Assistant Architect to the Board (who was, at the date mentioned, the temporary incumbent of the office of Superintending Architect), curiously enough makes no mention of the death of so old and valued an officer of the Board as the late Mr. George Vulliamy; nor does the Report of the Board itself make the slightest allusion to that event.

Place, and, passing the "New River Head," near Sadler's Wells, will terminate in St. John-street-road. The execution of this improvement will involve the removal of dwellings occupied by no fewer than 3,416 "persons of the labouring class," to accommodate whom the Board is to clear sites for the erection of artisans' dwellings, and only when these dwellings are completed will the Home Secretary give his sanction to the completion of the improvements.

The Report next details the numerous operations of the Board under the Artisans' and Labourers' Dwellings Acts, with the object of remedying the evils arising from overcrowding in large towns. The "schemes" with which the Board has had to deal under those Acts are very numerous.

Other sections of the Report deal with the operations of the Board as the Bridge Authority for the metropolis (save and except the City proper); with "Parks, Commons, and Open Spaces"; with "Bills in Parliament"; with the Fire Brigade; with Gas and Water Supply; and with, among other subjects, the London Coal and Wine Dues. With regard to this subject the Report says that "the Board's share of the proceeds of the duties, which have been continually increasing, amounts at the present time to about 325,000*l.* a year; and if the duties are allowed to cease in 1889, the date to which they are at present authorised, the Board will have to make good the resulting deficiency in its income by an increase of the Metropolitan Consolidated Rate of about two-pence halfpenny in the pound." The opponents of the continuance of the dues may retort that there is a *per contra* account; but without entering into the *pros* and *cons.* of the discussion, we may here, perhaps, be allowed to repeat what we said last week in one of our "Notes," namely, that if anything could justify the retention of the Coal and Wine Dues, it would be the application of their proceeds to the purchase of such open spaces as Clissold Park, Brockwell Park, and Ravenscourt Park. The preservation of such oases and breathing-spaces in the ever-increasing desert of bricks and mortar yclept "the Metropolis" would amply repay the necessary outlay on utilitarian and sanitary grounds alone.

The Board's financial transactions are on a scale commensurate with the size of the Metropolis. The Board's expenditure during the year 1886, including 976,781*l.* advanced on loan to other local authorities, 1,144,952*l.* invested in Treasury Bills, and 325,533*l.* applied to repayment of temporary loans and reduction of debt, amounted to 4,619,473*l.*, of which 1,128,108*l.* was defrayed out of money raised by the issue of Metropolitan Consolidated Stock. The total expenditure of the Board for the present year, 1887, is estimated at 1,794,624*l.*

The Report of the Superintending Architect, which forms Appendix No. 3 to the Board's Report, gives a mass of statistics as to the building operations of the metropolis, but the returns are only made up to the end of the year 1885. In that year the number of new building operations within the Board's jurisdiction (which, under the Metropolitan Building Act, includes the City proper) was 7,669, while additions and alterations and other works numbered 10,530. The Report also details the operations of the Architect's Department in regard to the construction of and means of exit from theatres and music-halls, a subject the importance of which has just been once more disastrously emphasised. The Report also shows the vast amount of work done in the Architect's Department in the valuation of property required by the Board in connexion with its various improvement schemes.

The Report of the Board, including the appendices, extends over just 201 pages, and it presents a mass of information of so much interest to the inhabitants of the Metropolis that its tardy appearance, already referred to, is only the more to be regretted.

Machinery at the Manchester Exhibition.—In reference to our article on this subject last week, Messrs. Browett, Lindley, & Co. write to say that "anti-friction metal" is not used for the bearings of the engines exhibited by them there, as erroneously stated in our report. Their own description of their "Australian engine," however, mentions anti-friction metal as a special excellence of their engine. It appears they have abandoned this, probably for the better.

The late Sir Horace Jones, Architect to the Corporation of London.

PORTRAIT OF THE LATE SIR HORACE JONES.

WE had intended to give a portrait of the late Sir Horace Jones last week by a reproducing process from a photograph, but the result (as sometimes happens with the various processes which have so much pushed engraving on one side of late years) was not such as would have been satisfactory to ourselves or to the late City Architect's friends.

Not wishing to abandon our original intention, we give a week later, rather than not at all, a portrait engraved from the same photograph,* by Mr. J. D. Cooper, who has succeeded in producing, in a very short time, what we think will be admitted by those who knew Sir Horace Jones to be a good likeness.

THE INSTITUTION OF CIVIL ENGINEERS.

ANNUAL REPORT.

THE Annual General Meeting of this Institution, to receive and deliberate upon the Report of the Council on the condition of the Institution, with the annual Statement of the Accounts, and to elect the Council and Officers for the ensuing year, was held on Tuesday last, June 7th, Mr. Woods, the President, being in the chair.

As the history of the Institution had been fully given in the Report submitted by the Council twelve months ago, it was remarked that on the present occasion it would suffice to deal mainly with matters which had transpired since.

The number of members on the roll of the Institution, on the 31st of March, 1887, was 4,347, of whom 20 were Honorary Members, 1,568 Members, 2,275 Associate-Members, and 484 Associates. This was a net increase of 173, or 4·19 per cent., on the 4,174 members of all classes recorded last year. The elections had included 34 Members, 234 Associate-Members, and 6 Associates, while the deaths, resignations, and erasures were 106. Many deaths had occurred among the older members of the Institution during the past twelve months, chief among whom must be placed Sir Joseph Whitworth, whose world-wide renown as a mechanician it was unnecessary to dwell upon. By his will he bequeathed to the Institution eighty shares, of 25*l.* each, in the firm of Sir Joseph Whitworth & Co., Limited.

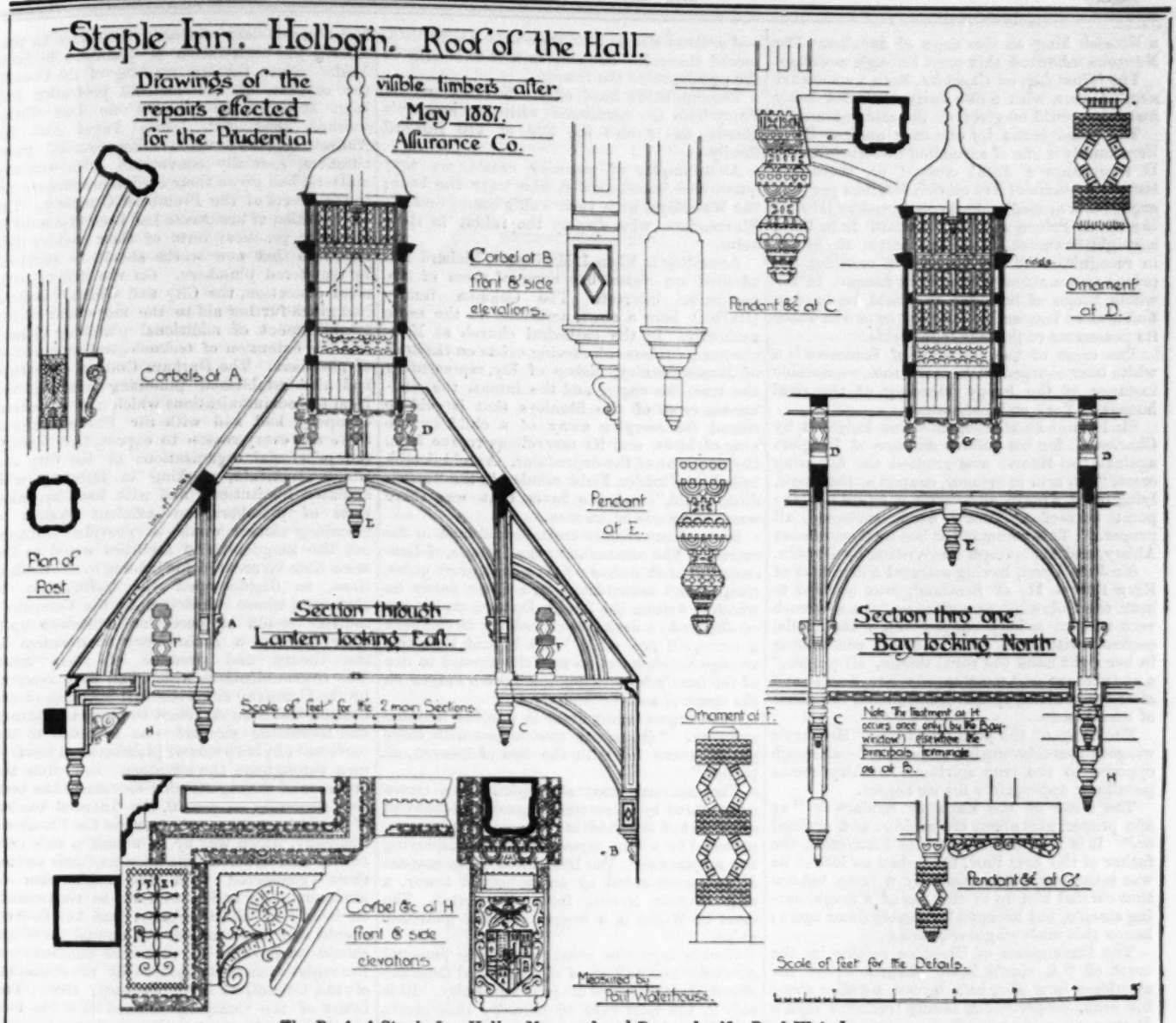
During the twelve months under review, 211 candidates were admitted as Students. On the other hand, 82 were elected into the Corporation as Associate Members, and 106 ceased, from various causes, to belong to the class. The total number of Students on the 31st of March last was 949, as against 926 at the same date in 1886.

Soon after their election, the Council endeavoured to negotiate with Sir Joseph Whitworth for the purchase of No. 24, Great George-street; but having failed in this, and No. 26, Great George-street, being in the market, that house was acquired for 13,000*l.* It was then deemed desirable to revive the option (which had lapsed) for the purchase of the freehold of No. 25, Great George-street, and this purchase was effected for 12,000*l.* The Council had then two designs prepared,—one for the rebuilding of No. 26, and incorporating it with the existing premises, and another for an entirely new building on the combined sites of Nos. 25, 26, and 27, Great George-street, it having been suggested that it might be desirable to acquire the latter house. After due consideration, the Council came to the conclusion that it was not expedient, at present, to enter into any large building operation, nor further to contemplate the purchase of No. 27. The intention then arrived at was to utilise the ground and first-floors of No. 26 by opening communications through the party-wall between Nos. 25 and 26, and to make these alterations during the coming recess. After the death of Sir Joseph Whitworth, on the 22nd of January last, his executors, — acting on directions given in his will,—offered the freehold of No. 24, Great George-street to the Institution for 15,000*l.*, being about the same rate per square foot of ground as had been given for No. 26 under the hammer. This offer the Council accepted. Thereupon, the tenants in No. 26 were informed that they might remain in occupation of their several offices on short terms of tenancy. It had been decided temporarily to open communications during the ensuing recess between the basements and ground and first floors of Nos. 24 and 25, at the lowest cost, and with the least structural disturbance. By these means increased accommodation would be provided for offices on the ground-floor, and for the library on the first and second floors, as well as for other purposes.

* The photograph is by Mr. S. A. Walker.

Sunderland Cemetery Extension.—Dr. Hoffman, from the Home Office Burials Department, has just inspected 18½ acres of land proposed to be added to the Bishopwearmouth Cemetery, making, with the present burial-ground, 52 acres. The estimated cost for subsoil and surface drainage, roads, and boundary-walls, with an additional entrance-lodge, and inclusive of the land purchased, is 17,500*l.*, per plans prepared by Mr. D. Balfour, C.E. Dr. Hoffman expressed his satisfaction with the proposed works, and particularly the subsoil drainage, which comprises 12-in., 9-in., 6-in., and 4-in. glazed fireclay socket-pipes laid with open joints in a stratum of gravel, the drains being 22 ft. apart regularly, or at one end of each grave, and at a depth of 10 ft. to 11 ft.

Newgate Prison and the Old Bailey Sessions House.—The Corporation of London are considering the question of the rebuilding of the Sessions House, but the decision they come to will turn upon the future of Newgate Prison, as to which the intentions of the Government are not yet known.


Staple Inn. Holborn. Roof of the Hall.
Drawings of the repairs effected for the Prudential
visible timbers after May 1887.
Assurance Co.
Corbel at B front & side elevations.
Pendant &c at C.
Ornament at D.
Corbels at A
Pendant at E.
Plan of Post
Section through Lantern looking East.
Section thro' one Bay looking North
Scale of feet for the 2 main Sections.
Ornament at F.
Note. The treatment at H occurs once only (by the Bay window) elsewhere the principals terminate as at B.
Pendant &c at G.
Corbel &c at H front & side elevations
Measured by Paul Waterhouse.
Scale of feet for the Details.

The Roof of Staple Inn Hall.—Measured and Drawn by Mr. Paul Waterhouse.

THE HALL OF STAPLE INN, HOLBORN.

THE drawings of the roof over the hall at Staple Inn, which are published in this issue, consist of sections (longitudinal and transverse) through the bay in which the lantern is placed. These drawings are based upon measurements carefully taken on the spot, and represent the roof in its present condition.

The Prudential Assurance Company, who are now the proprietors of the Inn, have entrusted the necessary repairs of the Hall to Messrs. Holland & Hannen, under the direction of Mr. Alfred Waterhouse, R.A., and great care has been taken that the sixteenth-century work should remain, as far as possible, in its original state. The paint has been carefully removed from the oak-panelling of the hall.

As regards the roof the only important measure of restoration has been the insertion of highly necessary tie-rods, one to each of the principals.

The Hall was the scene on Wednesday afternoon last of the tenth annual meeting of the Society for the Protection of Ancient Buildings, Mr. William Morris in the chair. The report (to which we may return) was adopted, and Mr. Frederic Harrison read a paper on "The Sacredness of Ancient Buildings." It was incidentally stated in the course of the proceedings, on behalf of the owners of the property, that the Hall is about to enter into the occupancy of the Institute of Actuaries, who will use it, we presume, for their meetings, and the Hall might perhaps be even more largely used as a convenient meeting-place for some of the learned and professional societies. It was further stated that the other buildings of the Inn, including the picturesque gabled buildings facing Holborn, are about to be very carefully repaired. The Hall will be open to the inspection of the public until the 24th inst.

NOTES ON CRESTS.

THE word "crest" is apparently derived from the Latin *crista*, a comb or ridge such as grows upon the heads of various species of birds; and Lower is of opinion that the idea (as well as the name) comes from this source.

The antiquity of crests is very great, and carries us back to the Classic ages for examples, such as the owl on the helmet of Minerva, perhaps one of the best known. Alexander the Great adopted the ram's head, the crest of Jupiter Ammon, from whom he claimed descent. Phædrus, in his account of the battle of the mice and weasels, represents the heads of the generals belonging to the mice as wearing horns for their crests.

Military commanders added to their stature, and also to their awe-inspiring aspect, by the use of a crest, in the form, generally, of some fierce animal or imaginary monster; and at the same time this distinction served for their own followers as a rallying point in the heat of the battle. In fact, the crest is otherwise known as the cognisance, from *cognosco*, because by it the wearer was known even in the thick of the fight.

Amongst the earliest devices adopted for the adornment of the helmet, the tall plumes of birds were used, and the heads of human beings; the eagle was also a favourite.

With regard to the *material* that composed the actual crest, Lower gives us his experience, and that is, that iron or wood were often used for the purpose; he gives as examples a demi-lion rampant of the latter material, in Etchingham Church, Sussex; and "a peacock in his pride" of iron at Laughton, being the well-known cognisance of the Pelham family. In both these instances the helmets themselves are preserved, and the crests are therefore of undoubted authority.

Although crests are of such great antiquity, they were not adopted in heraldry for some time after the introduction of shields or coats of arms, and Edward III. was the first monarch to wear one, as it appears on his great seal, taking the form of the lion statant guardant, which has ever since done duty as the crest of England. Edmund Crouchback, Earl of Lancaster, was one of the earliest users of an heraldic crest, his seal being nearly half a century earlier than that of our warlike Edward.

Originally considered of even greater honour than coats of arms, and permitted to be worn by commanders or chieftains *alone*, in our own day the crest has, to a great extent, been adopted to the exclusion of the more elaborate shield for the adornment of writing-paper, &c., by modern families wishing for some distinction of this nature.

Towards the close of the thirteenth century (according to Cussans) the practice arose of affixing a crest to the head of the charger, as well as to the helmet of its rider, which would doubtless add to the imposing appearance of both man and horse.

A remarkable crest was borne by the Bulstrodes of Buckingham, viz.,—"A bull's head, erased gules, attired argent, between two wings of the same," said to be derived from an ancestor, who, mounting his followers on bulls, attacked a camp of the Norman invaders, and carried all before him through the terror created amongst the enemy by this unaccustomed display of *cavalry*. Lower, who tells the tale, thinks it a fine cock-and-bull story.

To the Crusades we are indebted for some most interesting and historic examples of crests. The Newtons, of Barr's Court, Gloucestershire, bore "a King of the Moors, habited in a robe and crowned, kneeling and surrendering with his dexter hand his sword, all proper." This dates from Richard I., and was adopted by his follower, Sir Ancel Gornay, who took prisoner

a Moorish king at the siege of Ascalon. The Newtons inherited this crest through marriage.

The Minshalls, of Cheshire, have a somewhat similar crest, with a like derivation, and many instances could be given of the same nature.

The crest borne by the very ancient De la Bere family is one of exceeding historic interest. It represents a ducal coronet or, therefrom issuant a plume of five ostrich feathers per pale argent and azure," and was conferred by Edward the Black Prince upon Sir Richard de la Bere, a knight-banneret, after the battle of Cressy, in recognition of his bravery in rescuing the prince at a moment of imminent danger. In the whole range of heraldry it would be hard to find a more honourable bearing, or one in which its possessors could take more pride.

The crest of the Luttrells of Somerset is a white boar charged with a red rose,—a notable instance of the happy blending of the rival houses of York and Lancaster.

Sir Palmes Fairborne, who was knighted by Charles II. for his gallant defence of Tangiers against the Moors, was granted the following crest, "An arm in armour, couped at the elbow, lying on a wreath sustaining a sword; on the point thereof a Turk's head, turbaned, all proper." This commander lies in Westminster Abbey, and his epitaph was written by Dryden.

Sir John Lyon, having married a daughter of King Robert II. of Scotland, was allowed to bear the following as a crest:—"On a wreath vert and or, a lady couped below the girdle, enclosed within an arch of laurel, and holding in her right hand the royal thistle, all proper," a picturesque and most appropriate device, and afterwards borne by his descendants, the Earls of Strathmore.

The crest of the poet Drayton,—"Mercury's winged cap amidst sun beams proper,"—although opposed to the true spirit of heraldry, seems peculiarly appropriate for its bearer.

The crest of the Earls of Kildare is "an ape proper, girt about the middle, and chained or." It is recorded of Thomas FitzGerald, the father of the first Earl, that when an infant he was taken out of his cradle by a tame baboon that carried him up to the top of a neighbouring steeple, but brought him safely down again: hence this most singular bearing.

The Davenports of Cheshire rejoice in the crest of "A man's head couped below the shoulders in profile, hair brown, a halter about his neck, proper." A family tradition says a Davenport was vanquished at a conflict of the rival Roses, and was spared his life on condition that he and his descendants should bear this humiliating device.

Sir John Hawkins, on being made Paymaster of the Navy by Queen Elizabeth, had granted him for a crest, "A demi-negro proper, manacled with a rope," in allusion to his distinguished services in the slave trade. It was considered in those days as a grant of honour.

The crest of John, Lord Lysle, one of the founders of the Order of the Garter, is of extraordinary character,—"A millstone argent pecked sable, the inner circle and the rim of the second, the fer-de-moline or." Boutell gives a sketch of this in his popular work on heraldry.

The hereditary wardens of the Scotch Marches had for crest, "a horse's head, bridled." Another was "a spur erect between a pair of wings," both denoting a readiness to issue forth and pursue at any moment.

The celebrated Admiral Drake had a grant of a very fanciful though appropriate crest: "Out of a wreath a ship drawn round a globe with a cable rope by a hand issuing out of clouds, all proper" in chief, the motto "Divino auxilio."

The family of Hope may claim for themselves an equally appropriate if fanciful cognisance or crest: "Out of a wreath a broken globe surmounted by a rainbow issuing out of a cloud at each end, all proper."

The "Iron Duke" had as crest: "Out of a ducal coronet or a demi-lion rampant, gules, holding a swallow-tailed pennon of the last, the fly to the sinister, and at the head charged with the ensign of St. George."

The crest of the Viscount Downe is one of the most remarkable ones derived from that fruitful source the Crusades. It is thus blazoned: "A demi-Saracen in armour, holding in the dexter hand a ring, gold stoned azure, and in the sinister a lion's gamb erased or." It was granted to an ancestor, Sir William d'Aunay, who slew a Saracen prince and afterwards a lion, and then cut off the paw and gave it to the king, who gave the hero his ring in return and ordered him to bear the above device as a record thereof. The ring is said to be still in the possession of the family.

The dun bull's head of the Nevilles and the Percy lion are associated with our country's annals, as is also the lion of the Howard family.

As examples of *punning* crests, we may quote the Bacon family, who wear the boar; the Wolseleys, with their wolf's head; and the Warrenders, who display the rabbit in their helm.

According to Ellen J. Millington, Richard III. adopted *six* crests, but none of them of any particular interest. The Colonna family (Italian) bore a siren, according to the same authority. In the cathedral church at Manchester a curious oak carving exists on the stall of James Stanley, bishop of Ely, representing the tree, the eagle, and the infant, the well-known crest of the Stanleys that is said to record the carrying away of a child by the king of birds, and its marvellous rescue from the very nest of the depredator. An old Scotch ballad on Flodden Field alludes to the "swaddling child," and the havoc that was there wrought by one of its race.

Some of our modern crests are absurd in the extreme. The one borne by the Tetlows, of Lancaster, is of this class: "On a book erect gules, clasped and ornamented or, a silver penny on which is written the Lord's Prayer; on the top of the book, a dove proper, holding in the beak a crowquill pen sable." It is said that this strange conglomeration was the reward to one of the family for writing the Lord's Prayer on the space of a silver penny.

The Tongue family crest is another heraldic curiosity. "On an oak tree, a nest with three young ravens fed with the dew of Heaven, all proper."

The national crest of England is a crown surmounted by a lion statant guardant crowned or. That of Scotland is an imperial crown surmounted by a lion sejant guardant, displaying two sceptres or. The Irish crest is an ancient diadem surmounted by an embattled tower, a stag courant issuing from the portal. The crest of Wales is a dragon passant guardant gules.

Ruskin says the crest represents personal character and valour, as distinguished from the shield, the indication of race or family. It is only in the later days of heraldry that crests have been considered hereditary.

THE REGISTRATION OF PLUMBERS.

THE fourth meeting of the General Council for the Registration of Plumbers was held on Monday afternoon at the Mansion House, the Lord Mayor (Sir Reginald Hanson) in the chair, supported by Alderman Stuart Knill (Master of the Plumbers' Company), Mr. George Shaw, C.C. (Chairman of the Registration Committee), Mr. F. Machin (Warden of the Plumbers' Company), Mr. W. H. Bishop (Renter-Warden), Messrs. W. Digby Seymour, Q.C., C. Hudson, and W. Dent (Past-Masters of the Company); Mr. George Godwin, F.R.S., Sir Philip Magnus, F.R.S., Mr. H. Phillips, Mr. W. Braithwaite (Leeds), Mr. J. Sanders (Newport, Mon.), Mr. G. Evans (Shrewsbury), Mr. S. C. G. Fairchild, Mr. J. Underwood, Mr. F. Scott (Manchester), Mr. W. Titmas, Mr. C. T. Millis, Mr. John Smeaton, Mr. Geo. Davis, Mr. R. A. Nurse, and others.

The minutes of the previous meeting having been read and confirmed,

Alderman Knill, the Master of the Company, presented a report on behalf of the Court of the Company. That document stated that since the last meeting of the General Council was held progress had been generally satisfactory. Further evidences of public confidence in, and sympathy with, the movement had been manifested, and the movement had received increased assistance and support from the several interests which were specially represented on the General Council. Support from the side of Municipal Authority had been rendered in a conspicuous manner since the Council's last meeting, by the hearty co-operation of the present Lord Mayor (Alderman Sir Reginald Hanson), following his predecessors (Alderman Sir John Staples and Sir Robert Fowler). The Company had also received the support of the Mayors of Oxford, Bedford, Cardiff, Worcester, Brighton, Scarborough, Southport, Rochdale, and West Ham; and the Provost of Dundee had recently lent valuable assistance in promoting the registration of plumbers in Scotland. Since the last meeting of the Council the support of the medical profession had been accorded by persons no less distinguished than Sir James Paget and Sir Andrew Clarke; while other medical practitioners, specially conversant with sanitary matters, had given their cordial encouragement to the efforts of the Plumbers' Company. The co-operation of architects had been expressed in the very practical form of their making it a condition that new works should be executed by registered plumbers. On the side of technical education, the City and Guilds Institute had given further aid to the movement by the establishment of additional plumbing classes, and the extension of technological examination of plumbers. The Durham College of Science had also established plumbing classes; and from the communications which the Plumbers' Company had had with Sir Philip Magnus, there was every reason to expect, that through the provincial organisations of the City and Guilds Institute, working in harmony with affiliated institutions and with local organisations of plumbers, an efficient system of plumbing classes would be provided throughout the kingdom, and facilities would at the same time be secured for holding local examinations, to decide upon the qualification of plumbers, whose admission to the Company's register would be hereafter dependent upon their passing a satisfactory examination in the theory and practice of their craft. The communications which had been received by the Company since the last meeting of the Council had been sufficient to prove that strong and increasing support was accorded to the movement by both master plumbers and journeymen throughout the kingdom. But while the progress of the registration movement has been thus generally successful, the financial burden of it has been very onerous upon the Plumbers' Company, which was by no means a rich one, and it had other claims upon its funds besides those connected with the registration of plumbers. He had, therefore, to recommend, on behalf of the Company, that the Council should now fix the amount of annual fee which should be payable by plumbers enrolled upon the register, as contemplated by the resolution of the Council of 27th January, 1886. The Court of the Company desired that the fees should be moderate, but it is necessary that the annual expenditure should be in part, at any rate, provided for by annual fees, in order that the system of registration might be efficiently developed, and the names and addresses of registered plumbers made readily accessible to the public by means of advertisement and otherwise. On behalf of the Plumbers' Company, he had the pleasure to nominate the following gentlemen as Members of the General Council:—The Lord Mayor, and Messrs. S. Jennings, A. Common, J. Smith, J. C. Ashdown, George Davis, and R. A. Nurse, the latter representing the United Operative Plumbers' Association of Great Britain and Ireland, whose members number upwards of 4,000, distributed over the whole of the United Kingdom.

Mr. George Shaw, C.C., Chairman of the Registration Committee, next presented a statement showing that since the last meeting of the Council the number of plumbers registered had reached 776, divided as follows:—126 masters in the London district, 353 journeymen in the London district; 155 masters in the provinces, 142 journeymen in the provinces; 308 further applications had been considered by the Committee, and there was a considerable number of applications still to be dealt with. The applications received showed that the system of registration was growing in favour with plumbers in all districts. The system of dealing with applications and examining applicants for registration was now in fair working order in London. But some of the applications came from parts of the kingdom where it was difficult to obtain satisfactory information; and, pending the establishment of local organisations of plumbers to deal with examinations and obtain other evidences of applicants' qualifications, delay in dealing with those applications unavoidably arose. Negotiations were now in progress and action was in contemplation which would, he hoped, eventually secure adequate management of the registration system throughout the provinces. In cases where applicants for registration were unable to produce satisfactory evidence of their experience in the

trade, they were required to pass an examination by a Board of Examiners (composed of practical plumbers, one-half the number being masters and the other half journeymen); and those examinations had disclosed the fact that men engaged in the trade and desirous of being registered as qualified plumbers were actually unable to pass the most simple test in any branch of the craft. The examination returns were not yet complete, and he could not, therefore, state the precise proportion of successful to unsuccessful candidates examined. The numbers had varied considerably. At some examinations nearly every applicant had passed; at others, 5, 10, and in one case 50 per cent. of the applicants failed, although the examinations were purposely made so moderate as to prevent the exclusion of any man of average ability fairly entitled to be considered a plumber. The examination of plumbers in the provinces would, he anticipated, be considerably facilitated by the development of the City and Guilds Institute system of plumbing classes and examinations. In order to bring the development of this system as far as possible into harmony with the Company's system of registration, it had been decided that plumbers passing both the theoretical and practical examinations of the City and Guilds Institute should be qualified for registration upon compliance with the Company's regulations.

Mr. W. H. Bishop, Renter-Warden, next made a financial statement to the General Council. From this it appears that the gross expenditure incurred by the Plumbers' Company up to May 31st, in connexion with the movement which has resulted in the establishment of the system of registration of plumbers, amounts to 2,017*l.* 8s. 8d. Against this expenditure, 849*l.* 19s. 6d. has been received by the Company as the registration fees payable by plumbers upon enrolment on the register. The net balance of expenditure incurred by the Company up to May 31st is 1,167*l.* 9s. 2d. The estimated expenditure in connexion with registration for the year 1887–8 is 866*l.* If annual fees were paid to the Company by the plumbers now registered, at the rate of 10s. 6d. from masters and 2s. 6d. from journeymen, the total amount would equal 209*l.* 8s., leaving a deficiency of 656*l.* 12s. to be provided by the Company. The cost of publishing lists and advertising the names and addresses of registered plumbers must, of necessity, be exceptionally heavy in the early stages of the system.

The Master, Mr. Alderman Stuart Knill, next formally moved, "That the Reports of the Master and Chairman of the Registration Committee now presented to the meeting be adopted."

Mr. George Godwin, having been invited to second the motion, said he did so with great pleasure. He had taken much interest in the subject, as the Committee knew, for many years. He was sorry that he could not find so much satisfaction in the Reports as others did. The progress was terribly slow, and it was obvious that something more must be done to enlist, not merely the masters and the men, but the public. After all this time, expenditure, and effort to have registered only 495 of the army of journeymen plumbers existing in the country was almost disheartening. It was most difficult to make a thing known in London, and advertising was costly. But it must be done, nevertheless, if they wished to succeed. He was not casting the slightest slur on the work of the Worshipful Company of Plumbers: their proceedings had been most praiseworthy, and they had already disbursed a considerable sum of money. It seemed to him that the public should now aid in the matter. It was a subject of national concern. The lives that had been lost through bad plumbers' work were uncountable; and bad work continued to be done in every direction. He was not surprised to hear that so small a proportion of those who came up for examination had been unable to pass. Knowledge of the way in which work was being done showed that this inability must exist. As to the examining body, he was not quite sure that it should consist wholly of plumbers, unless they were exceptional men. He thought it should include a couple of scientists; doubtless, however, the Committee had given this consideration. He said he would make only one other observation, and that was to express his regret that any fee, however small, should be asked from the journeymen on registration. He thought no obstacle should be opposed to it, at any rate, at present.

It was moved by the Master of the Company, seconded by Mr. George Shaw (Chairman of the Registration Committee): — "That the annual fees payable by master plumbers be 10s. 6d., and by journeymen plumbers 2s. 6d., upon renewal of the lists of Registered Plumbers, on the 21st of July in each year." This was carried, and the proceedings terminated.

Illustrations.

NEW MAIRIE, ARCUEIL-CACHAN, FRANCE.

WE give this week a view of another of the new Mairies or local town-halls which are springing up in the environs of Paris. The architect is M. Ulysse Gravigny. The style of the building is described as that of the Louis XIII. period; it is an example of the semi-playful manner in which the modern French architect makes use of the material of Renaissance detail. The general grouping of the building is such as to suit the nature of the site, which, from its triangular shape, is an awkward one to deal with. The stone dressings are of the "pierre du pays" in the lower part of the building and of Châtillon stone above, the hard stone used for the steps, &c., being "Roche de Bagneux." The carving has been executed by M. Damé.

The chief feature of the interior is the grand staircase of iron, with treads of "roche de Chassiguelles." The council-chamber, the library, and the Mayor's private room occupy the first floor, leaving the rest of the building for the remaining offices.

All the floors are of iron construction, and the principal timbers of the roof, as well as the dormers, &c., are of oak. The cost of the building has been about 300,000 fr., or 12,000*l.*

CHAPEL AT THE ROYAL HOLLOWAY COLLEGE.

THE chapel, of which we give an illustration in the present number, is 125 ft. from east to west, 30 ft. wide, and 30 ft. high. The ceiling, which is elliptical, is decorated with alto-relievi of the prophets and evangelists, and attendants. These groups are placed in the spandrels between the six semicircular-headed windows.

The half-domed ceiling of the apse contains the "Creation of Eve," the central figure being "God the Father descending from Heaven," supported by angels. The whole of this work, together with the sculptured panels in the pilasters, keystones, &c., in the chapel, was designed by Signor Fucigna, who also designed all the carving for the college. His death occurring before the completion of the building, the small portion remaining to be done was executed by Signor Boldini, his assistant.

The whole of the interior has been decorated in oil colour and gold, by Messrs. Clayton & Bell, the warm-tinted freestone used in the construction forming the ground. The key of colour is high, after the manner of the Sistine Chapel in Rome, the lower part of the walls being the strongest in colour, and forming a rich dado from the floor to the window-sills. The flat wall spaces above this are of a soft green, broken by deep red in the niches between the windows.

The wagon-vault of the ceiling is treated with gold as a groundwork, but this is divided into panels by longitudinal and transverse belts, corresponding to the architectural lines below, and the panels thus formed contain figures in medallions of the six Archangels, with their attributes. These, like the subject in the semi-dome of the apse, are on blue grounds.

The groups on the ceiling already mentioned in alto-relievo, are delicate in colour, somewhat in the manner of old ivories, folds and hollows being emphasised and the colour rubbed off the prominent parts, thus avoiding heaviness.

Chapels are provided at both ends. Those at the east end being for invalid students, and those at the west end being intended for visitors.

The grilles and balcony in the chapel, which are of wrought and welded iron, without rivets or screws, and gilt, together with a wrought-iron gate at the door of the chapel, have been carried out by Mr. Barford, of Maidenhead.

The baldachino and organ-case, in low polished oak and walnut, which were specially designed by the architect, were executed, together with the oak seating and stalls, by Mr. Thompson, the contractor for the College. The floor of the chapel is of black and white marble. The lamps and brackets of brass, from the architect's design, were made by Messrs. Verity & Son.

GRAYTHWAITE HALL.

GRAYTHWAITE HALL, proposed to be rebuilt for Lt.-Col. Myles Sandys, M.P., is situated at Windermere, midway between the Ferry and Lakeside.

The present Hall, which does not possess any special points of architectural interest, is placed at so low a level in the park as to lose much of the beauty of the surrounding scenery.

To remedy this, the new building will be erected on a terrace raised some 10 ft. above the present floor-line. The internal arrangements comprise the usual requirements of a country mansion. The materials proposed to be used are, blue local stone quarried on the estate for the walls, with red sandstone for the dressed work; red tile roofs, and red brick chimneys. By this combination warmth of colouring is secured, in which the buildings of this district are generally very deficient.

The woodwork in the more important parts will be of English oak, felled on the estate. Alterations in the park will involve the erection of new gate-lodges, &c., which, with the stables, have been designed to harmonise in character with the Hall.

The architect for the work is Mr. R. Knill Freeman, F.R.I.B.A., of Manchester and Bolton, the illustration published being from a drawing in this year's Royal Academy Exhibition.

THE NEW (R.C.) CHURCH OF ST. JAMES, SPANISH-PLACE.

WE this week give an interior view of Messrs. Goldie, Child, & Goldie's revised design for this fine church. We gave the exterior view of it last week.

ABERDEEN ROYAL INFIRMARY.

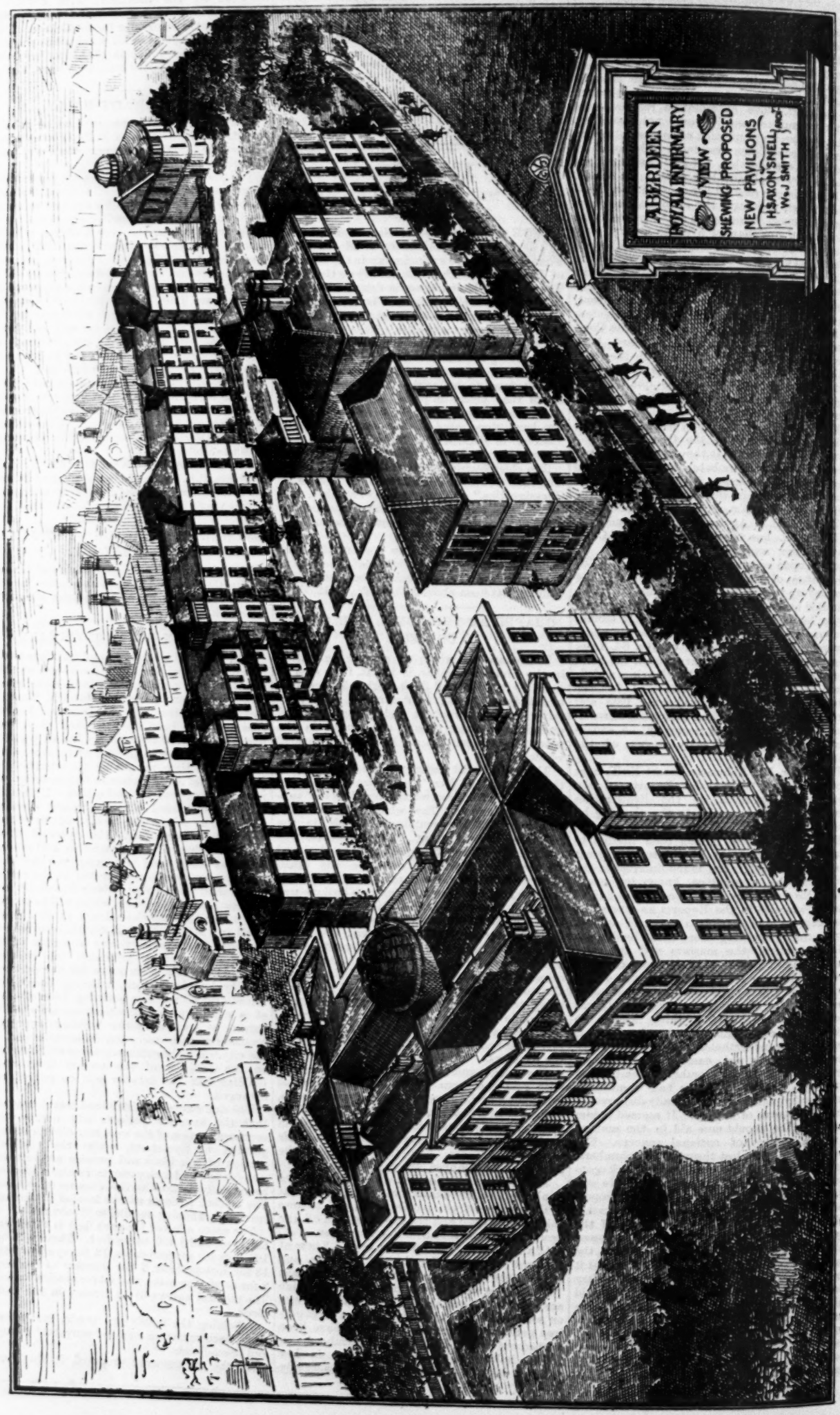
THE proposed alterations and additions to the Aberdeen Royal Infirmary buildings are the result of long and careful consideration given to the question by the Committee of Management during the last two years. Various schemes have been discussed and plans prepared with a view to avoid, as far as possible, interfering with the present structures, while at the same time preserving the essentials of good hospital construction as laid down by the most eminent modern authorities. Ultimately it was determined that the truest economy would be to adopt the design of Mr. Saxon Snell for converting the present front main building to administrative and clinical purposes only, and removing all patients into new pavilions to be erected at the rear of the ground facing respectively Spa-street and Woolmanhill. The plans, which will be carried out under the superintendence of Mr. Saxon Snell and Messrs. W. & J. Smith, have been so arranged as to preserve (as a portion of the wards for ordinary patients), the building erected some few years since for the purposes of a typhus fever ward, it having been determined that all patients suffering from diseases of a contagious or infectious nature shall in future be treated at the buildings expressly erected for their reception in another part of the city. No alteration whatever will be made on the exterior of the present front main building, but the interior will be entirely re-arranged.

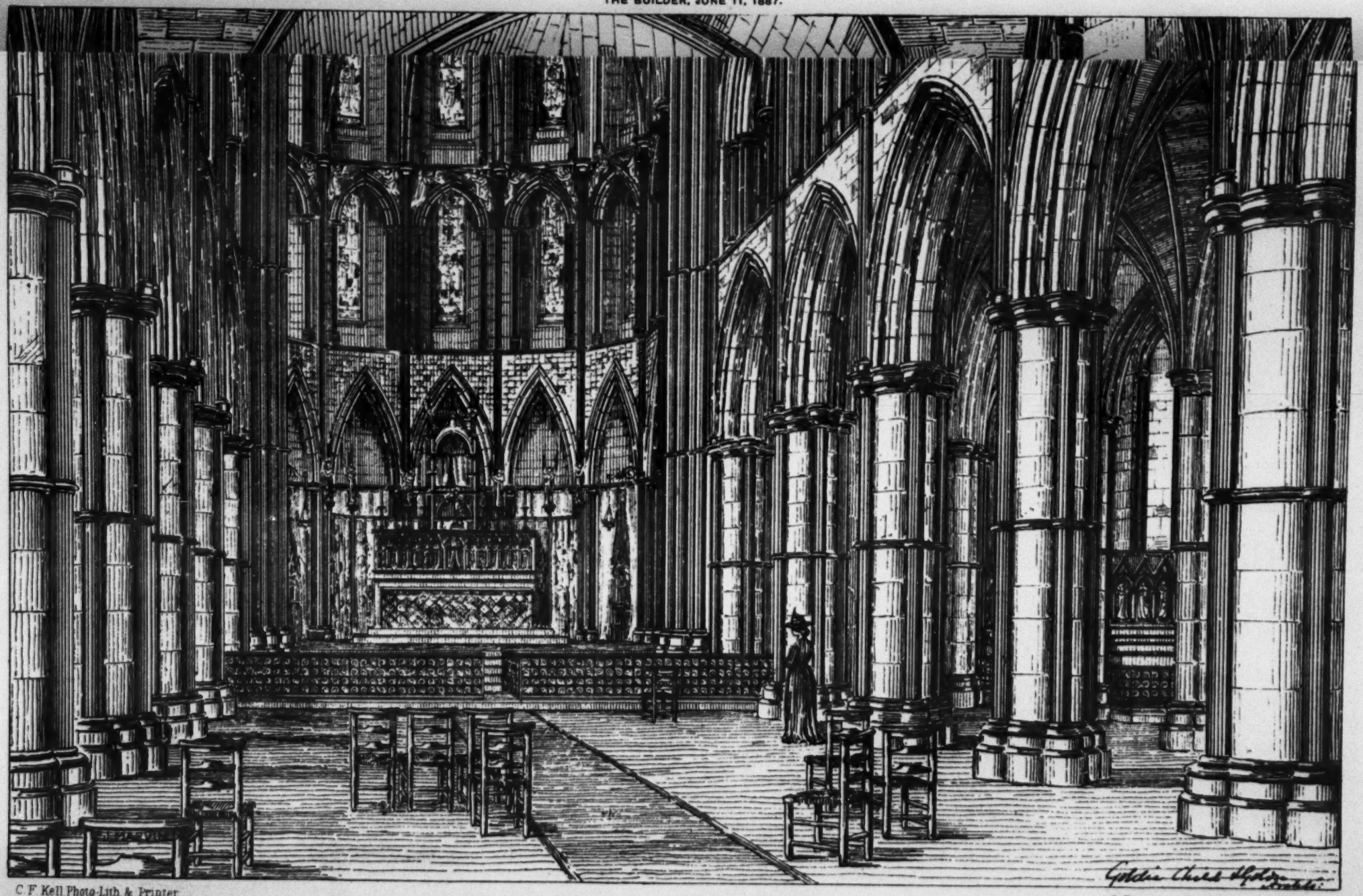
The sick wards are distributed in such manner that the surgical patients will occupy the southern portion of the west rear block, running parallel to Spa-street, whilst the northern portion of this block will provide accommodation for eye and lock patients, as also a ward to be specially devoted to the diseases of women. The medical patients will be located in the east rear block, running parallel to Woolmanhill.

The space allowed for each bed is 90 superficial feet and 1,400 cubic feet. There will be 108 beds for surgical cases, 12 for eye patients, 13 for lock patients, 7 for diseases of women, 8 for erysipelas cases, and 84 for medical cases. The medical cases will be located in the east block.

Adjoining the wards are w.c.'s, lavatories, sinks, bath-rooms, sister's and surgeons' rooms, and linen-closets.

By the arrangement proposed, in the West


ABERDEEN
ROYAL INFIRMARY
VIEW
SHEWING PROPOSED
NEW PAVILIONS
H.SAXON SNELL
W.J SMITH



C. F. Kell Photo-Lith. & Printer.

8, Furnival St. Holborn, London, E.C.

CHURCH OF ST. JAMES, SPANISH PLACE: REVISED DESIGN.—MESSRS. GOLDIE, CHILD, AND GOLDIE, ARCHITECTS.

SHEWING PROPOSED
NEW PAVILIONS
H.SAXON SNELL AND
W.J SMITH

C.F Kell Photo-Lith & Printer.

8, Furnival St Holborn, London, E.C.

CHURCH OF ST. JAMES, SPANISH PLACE: REVISED DESIGN.—MESSRS. GOLDIE, CHILD, AND GOLDIE, ARCHITECTS.

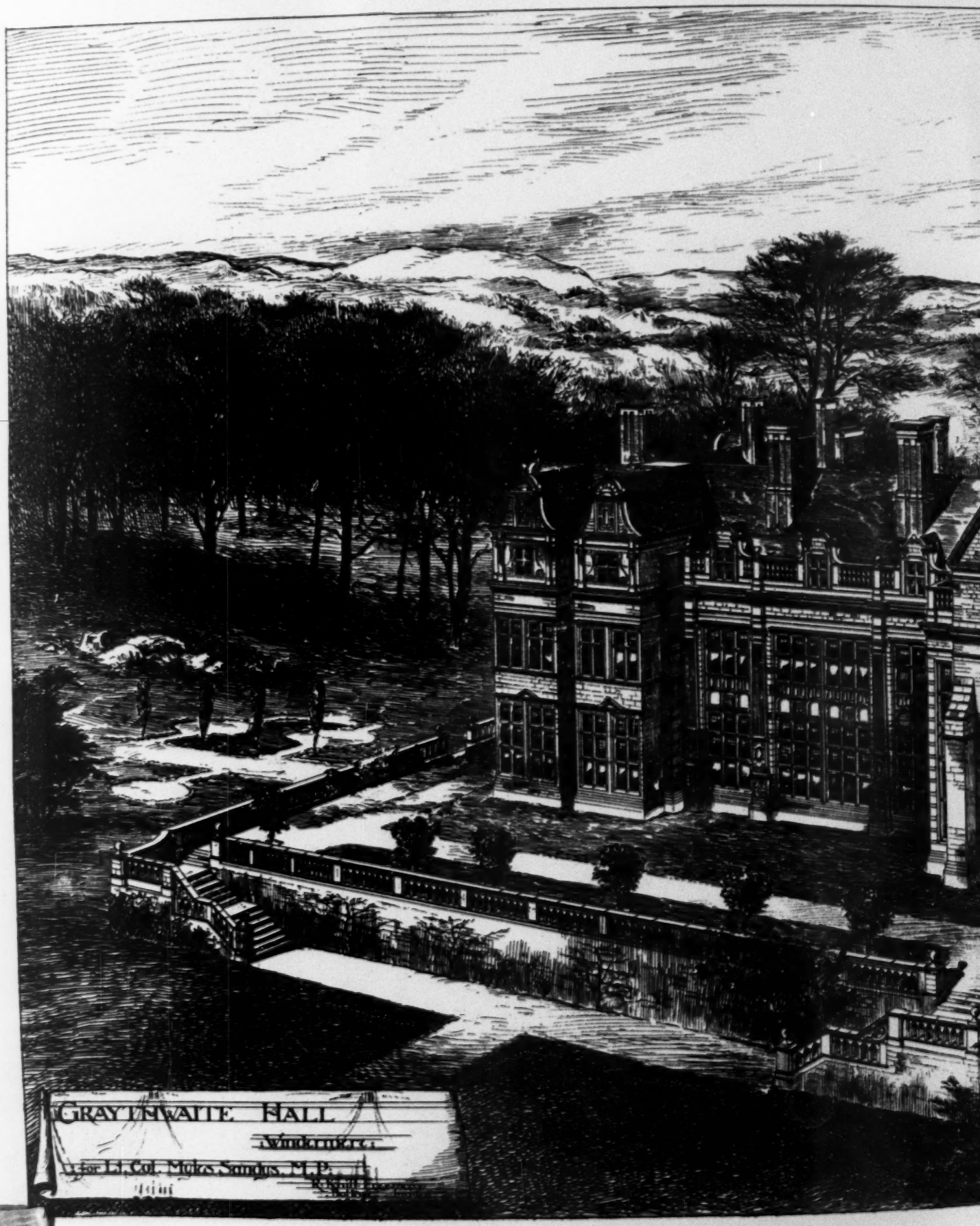
The Phototype Co., 208, Strand, London.

THE NEW MAIRIE AT ARCUEIL-CACHAN (SEINE).

M. Ulysse Gravigny, Architect.

The Phototype Co., 308, Strand, London.

INTERIOR OF CHAPEL, HOLLOWAY COLLEGE.—Mr. W. H. Crossland, Architect.


GRAYTHWAITE HALL
Windermere
for Lt. Col. Myles Sandys, M.P.

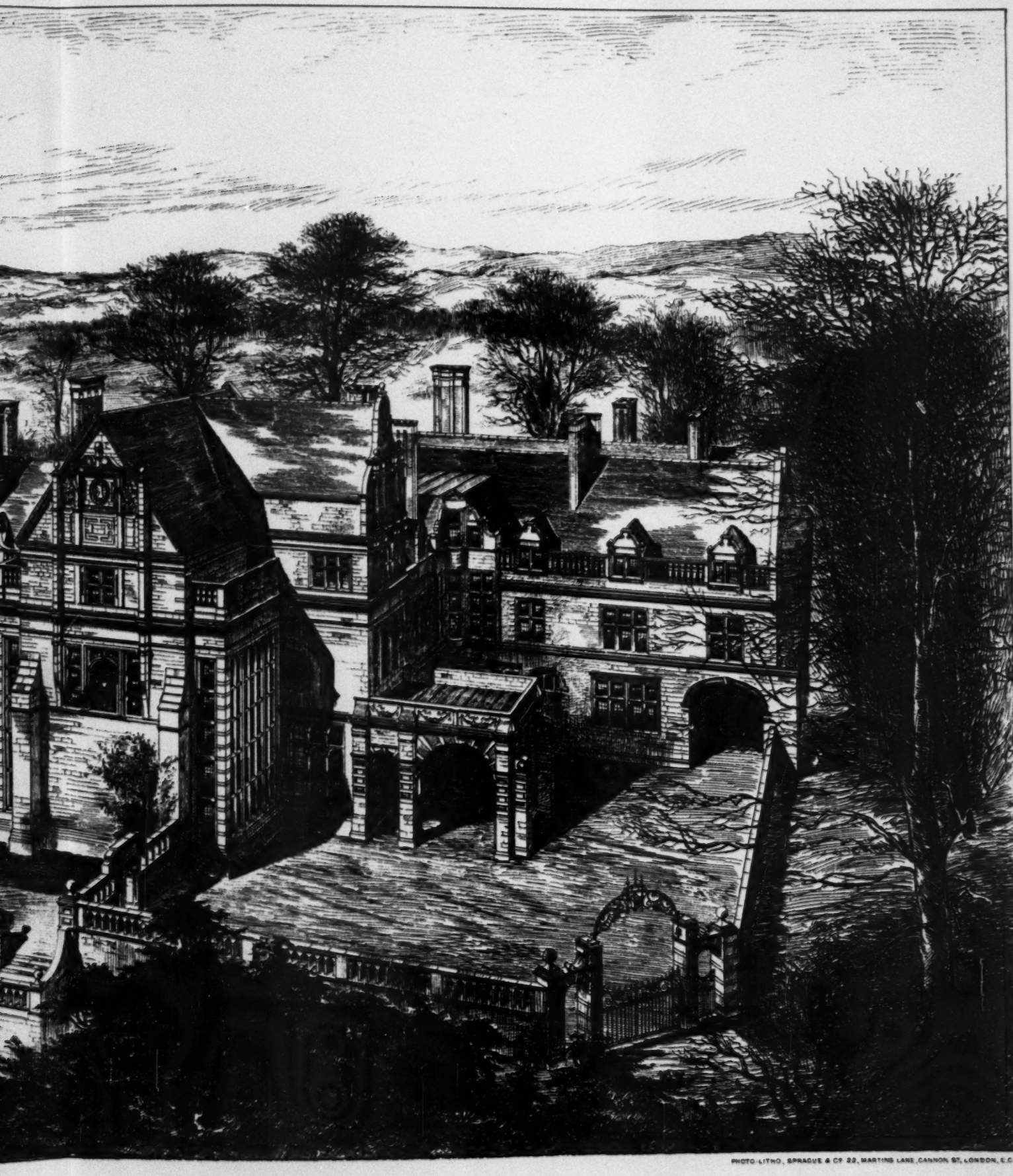
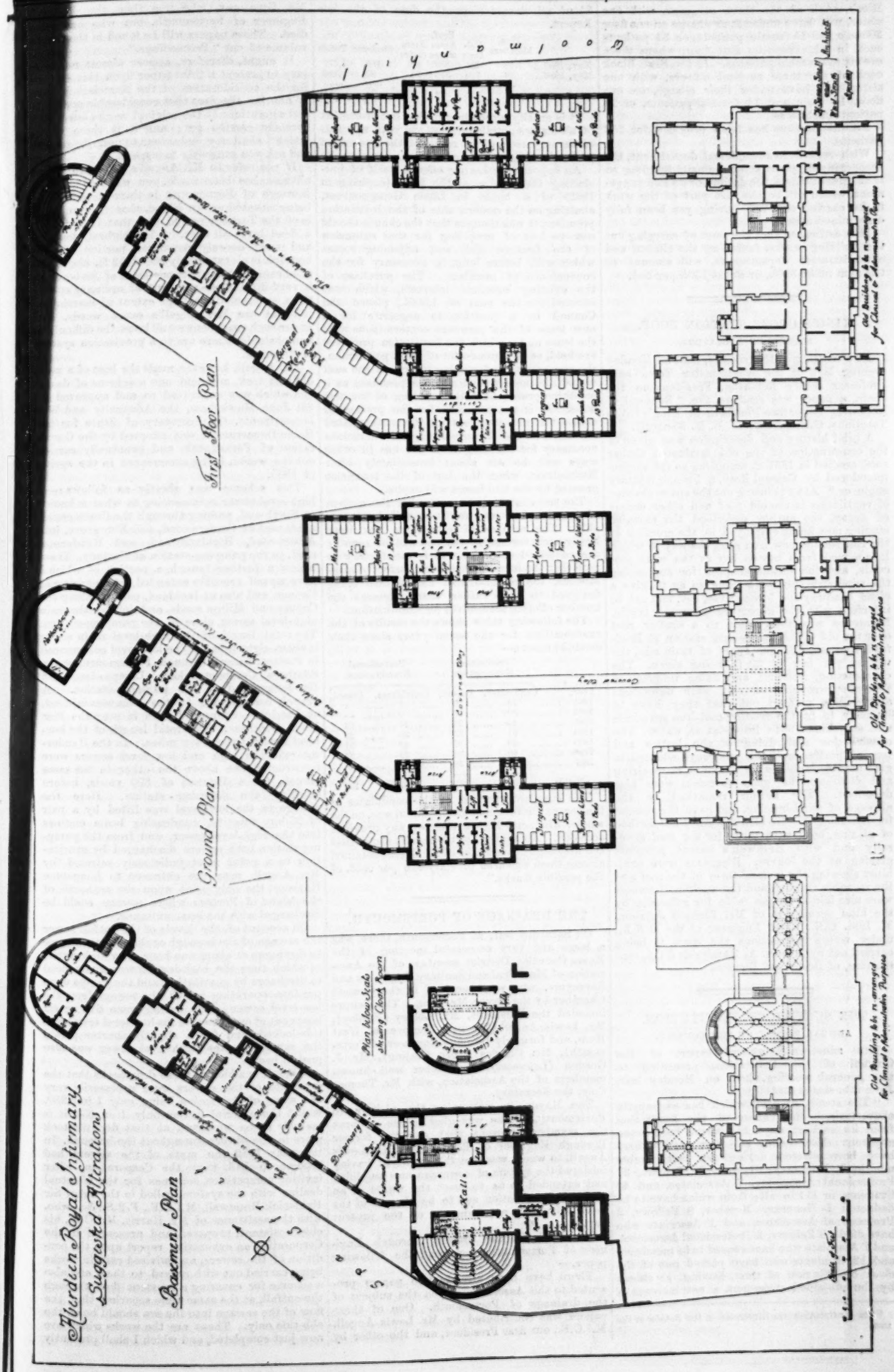


PHOTO-LITHO., SPRAGUE & Co 23, MARTINS LANE, CANNON ST., LONDON, E.C.


Aberdeen Royal Infirmary
Suggested Alterations
Basement Plan
Ground Plan
First Floor Plan
Plan below Skate Shoeing Clock Room
Old Building to be arranged for Chancel & Administrative Purposes
Hall
Dispensary
Surgical Ward
Medical Ward
Female Ward
Male Ward
Corridor
Court

Block, each of the three surgeons, with one sister, will have under their charge on one floor 20 male and 14 female patients, or 34 patients each in all, except on first floor, where there are six extra male patients. In the East Block each of the three medical officers, with one sister, will have under their charge, on one floor, 14 male and 14 female patients, or 28 patients each in all.

Accommodation has been provided for 233 patients.

With regard to the clinical department, the accompanying plans show the main building as it at present exists, the design for its re-arrangement, which will be the last part of the work to be carried out, not having yet been fully determined upon.

It is estimated that the cost of carrying out the building works, including the clinical and administrative departments, will amount to the sum of 30,390*l.*, or about 130*l.* per bed.

KING'S CROSS STATION ROOF.

SOCIETY OF ENGINEERS.

AT a meeting of this society, held on Monday evening last at the Westminster Town-hall, Professor Henry Robinson, President, in the chair, a paper was read on the "Renewal of Roof over Departure Platform at King's Cross Terminus, G.N.R.," by Mr. R. M. Bancroft.

A brief history and description was given of the construction of the old laminated timber roof, erected in 1851–2, according to the system introduced by Colonel Emy, a French military engineer.* After pointing out the entire absence of ventilation in the old roof and other causes of decay, the author described the movable staging now being employed in the erection of the ribs for the new iron roof, the way in which it is moved from bay to bay as the work proceeds, and the means adopted for supporting the superstructure of staging so as to give a clear headway for locomotives, &c., and not to interfere with the departure passenger traffic. Reference was then made to a similar roof over the old G.N.R. passenger station at Bradford, its span, distance apart of main ribs, the weight per bay of 20 ft. being given. The construction, hoisting, and fixing in place of the new wrought-iron ribs were described; and it was pointed out that they have to be made to fit the existing cast-iron spandrels and stanchions built into station walls. The construction and fixing of the lattice and trussed purlins, and the gangways adopted to give greater facilities for workmen in repairing and cleaning the glass covering, were also described. The author remarked on the absence of wind-bracing, and gave the reasons for not using it. He also described the method of glazing, both with putty for the roof generally and with Helliwell's patent puttyless glazing at the louvre. Diagrams were exhibited showing the general form of the roof and the movable staging, and the working drawings were also laid upon the table for reference by the kind permission of Mr. Richard Johnson, M. Inst. C.E., Chief Engineer of the G.N.R., under whose instructions the work is being carried out by Messrs. A. Handyside & Co., contractors, of Derby and London.

THE SURVEYORS' INSTITUTION.

ANNUAL REPORT OF THE COUNCIL.

THE nineteenth annual report of the Council of the Institution, presented to the general meeting, held on Monday last, June 6th, states that

"The steady progress which has so happily characterised the career of the Institution from its earliest days has never been more apparent than during the past year. There have been elected during the last twelve months 1 Honorary Member, 32 Fellows, 31 Professional Associates, 7 Associates, and 40 Students, or 111 in all; from which have to be deducted 1 Honorary Member, 8 Fellows, 2 Professional Associates, and 1 Associate who have died; 3 Fellows, 2 Professional Associates, and 1 Associate who have ceased to be members; and 12 Students who have passed out of the class by effluxion of time, leaving, as shown by the subjoined statement, a net increase of 81 of all classes since the date of the last Report.

	Hon. Members	Fellows	Prof. Associates	Associates	Students	Totals
May, 1887...	16	725	339	89	108	1,277
May, 1886...	16	700	316	84	80	1,196
	—	25	23	5	28	81

It is gratifying to observe that out of the 111 of all classes enrolled during the year, upwards of seventy are a direct result of the system of professional examinations. . . . .

An opportunity having offered itself of purchasing the residue of the lease (expiring in 1892) of a house in Little George-street, abutting on the eastern side of the Institution premises, it was thought that the chance should not be lost of providing for that extension of the Lecture Hall and adjoining rooms which will, before long, be necessary for the convenience of members. The purchase of the existing leasehold interests, which was effected for the sum of 1,300*l.*, placed the Council in a position to negotiate for a new lease of the premises conterminous with the lease under which the Institution premises are held, at a ground-rent of 135*l.* per annum, the corporation undertaking to expend the sum of 200*l.* in improvements to the premises as a condition precedent to the granting of the new lease. It is not proposed for the present to utilise the new premises for the contemplated extension of the Lecture Hall; but alterations necessary for adapting them for use in other ways will be set about immediately after Michaelmas, when the last of the tenancies granted by the late lessee will expire.

The success which has attended the system of examinations may fairly be called remarkable. The number of candidates has been larger each successive year, as will be seen by the subjoined statistics. It is satisfactory to note that the increase has been perfectly spontaneous, the conditions of candidature being designed to limit rather than augment the number offering themselves for examination.

The following table shows the results of the examinations for the seven years since their establishment:—

	Preliminary Examination.		Professional Examinations.	
Year.	Candidates.	Passed.	Candidates.	Passed.
1881	13	6	2	1
1882	30	17	0	—
1883	44	22	25	22
1884	51	30	36	23
1885	46	37	43	31
1886	48	34	56	38
1887	53	39	58	45
Totals	283	185	220	160

The standard reached by the candidates in the recent Professional Examination was, on the whole, distinctly higher than on any previous occasion. An analysis of the results shows that the fifty-eight candidates of all classes obtained among them upwards of sixty-one per cent. of the possible marks."

THE DRAINAGE OF PORTSMOUTH.

ON Saturday last, at Portsmouth, there was a large and very successful meeting of the Home Counties District members of the Association of Municipal and Sanitary Engineers and Surveyors, who were received in the Council Chamber by the Mayor, Mr. King. The visitors included the President, Mr. Lobley (Hanley), Mr. Lewis Angell (Borough Engineer of West Ham, and formerly Borough Engineer of Portsmouth), Mr. Charles Jones (Ealing), Mr. J. Gordon (Leicester), and other well-known members of the Association, with Mr. Thomas Cole, the Secretary.

The Mayor, in welcoming the visitors to Portsmouth, said he was glad to see amongst the members present that day the former Borough Engineer of Portsmouth, Mr. Lewis Angell, to whom was due the credit of having initiated the system of sewerage now amplified and extended so as to meet the wants of an increasing population and to be abreast of the more advanced requirements of the present day.

Mr. Boulnois, the present Borough Engineer of Portsmouth, then read the following paper,—

There have been already two papers presented to this Association upon the subject of the drainage of Portsmouth. One of these papers was contributed by Mr. Lewis Angell, M.I.C.E., our first President, and the other by Mr. Greatorex, who was then the Borough Engineer of Portsmouth, but who has since died. These papers will be found in the fourth volume of our "Proceedings."

It might, therefore, appear almost unnecessary to present a third paper upon this subject for the consideration of the Association, were it not for the fact that considerable additions and alterations to the original works have been recently carried out; and it is these works which I shall now endeavour to describe to you, and ask you presently to inspect.

If you refer to Mr. Angell's paper, to which allusion has been made, you will find that the Borough of Portsmouth is there described as being situated on an island, that its formation is of the Tertiary period, and that it is nearly a dead level all over. "The highest, busiest, and most densely populated portion of the borough is elevated only about 12 ft. above the tidal range, while about one-third of the borough is very little above the level of ordinary spring tides, and includes a large extent of marsh."

These are Mr. Angell's exact words, and under such conditions we all know the difficulties and obstacles there are to a gravitation system of drainage.

Mr. Angell, however, made the best of a most difficult task, and laid out a scheme of drainage which was submitted to and approved by Sir John Hawkshaw, the Admiralty and War Departments, the Secretary of State for the Home Department, was adopted by the Corporation of Portsmouth, and eventually carried out the works, being commenced in the spring of 1865.

This scheme was shortly as follows:—a high-level sewer commencing at what is known as North-end, passing through the Commercial-road, part of Somers-road, and Elm-grove, into Albert-road, Highland-road, and Henderson-road, to the pumping-station at Eastney. There is now a further branch, a portion of which I have myself recently extended, commencing at Copnor, and also at Inchland, passing along the Copnor and Milton roads, and joining the main high-level sewer close to the pumping-station. The total length of the high-level main sewer is about eight miles. The low-level commenced in Portsea, passed through Portsmouth, across Southsea Common, along Lumps-lane and Henderson-road to the pumping-station. A branch commencing in the Commercial-road, at Landport, connected with it near the Pier Hotel, Southsea. The total length of the low-level sewer is about six miles. In the Henderson-road the high and low level sewers were constructed one above the other in the same trench, for a distance of 800 yards, before entering the pumping-station. Here the sewage in the low-level was lifted by a pair of 25-h.p. rotative, condensing beam engines into the high-level sewer, and from the pumping-station both sewers discharged by gravitation to a point most judiciously selected by Mr. Angell, near the entrance to Langstone Harbour, the only point upon the seaboard of the island of Portsea where sewage could be discharged with the least nuisance.

On account of the levels of the outfall sewer the sewage of the borough could only commence to discharge at about one hour after high water, at which time the high-level sewer commenced to discharge by gravitation, and the pumps were put into operation to lift the sewage from the low-level sewer; thus, during some five or six hours out of every twelve the low-level sewer was tide-locked, and for a slightly shorter period the sewage in the high-level sewer was also pushed back.

When it is added to these drawbacks that the gradients of the sewers were necessarily very flat, some of the mains being only 1 in 5,280, whilst the arterial drains only 1 in 650, it is scarcely to be wondered at that deposits took place in the sewers throughout the borough. In the year 1882 the state of the sewers had become so bad that the Corporation, after inviting competition schemes for the effectual dealing with the system, called in the aid of Sir Frederick Bramwell, M.I.C.E., F.R.S., &c., who, with the assistance of Mr. Harris, M.I.C.E., his chief assistant, prepared and presented to the Corporation an exhaustive report upon the condition of the sewers, and advised certain works being carried out with regard to them and also a scheme for ensuring a constant flow through the outfall, at the same time securing that the flow of the sewage into the sea should be on the ebb tide only. These are the works which are now just completed, and which I shall presently

* Its construction was illustrated in the *Builder* at the time.

ask you to inspect, but before doing so it will be well to give you the following description of them, this description being partly taken from a report presented to the Town Council at the recent ceremony of opening the works.

The new works consist of a sewage-collecting tank, constructed on a piece of ground which the Corporation obtained from the Governmental authorities near Fort Cumberland. This tank, or rather series of three tanks, is competent to contain all the sewage produced in the district during any one tide, not only from the present population of about 138,000 inhabitants, but also from the population of twenty years hence, estimated to increase at the rate of the last decennial period from 1871 to 1881, and competent also to contain (with the same increase) the sewage of that portion of the borough, *i.e.*, Stamshaw, lately drained, the sewage of the Government establishments, and a proportion of the surface-water from those districts where the surface-water is not separated from the sewage proper. The tank has, therefore, been made capable of containing, when full, as much as four and a half millions of gallons, and it covers an area of nearly three acres and a quarter.

In this tank the sewage will be stored during those hours when the tide is rising, and also during those hours when it has fallen so low as to render it inexpedient to discharge into the harbour,—that is to say, for about eleven hours out of every tide. With the object of allowing the outflow to begin at such early period after high water as may be found best in practice, the sloping bottom of the tank has been placed only 1 ft. below ordinary high water.

The tank is divided into three distinct and practically equal compartments, any one of which can, if necessary, be thrown out of use for repair. Advantage has been taken of this construction to make the tank self-flushing, that is to say, it has been so arranged that the contents of any full compartment can be used to flush an empty compartment, and although, as the tank is filled by pumping, and not by gravitation, there should not be any sewage in excess of its capacity pumped into it, yet each compartment of the tank is provided with an overflow into the outlet culvert.

At the request of the military authorities, a provision has been made for ventilating the tank by means of a chimney having in it a furnace kept continually burning, so as to cause an efficient draught, the inlet of the air for this ventilation is at the shallowest end of the tank, the chimney through which the air is carried being 90 ft. in height.

In order to ensure the rapid discharge of sewage, which is essential in this scheme, the outlet culvert has been made 7 ft. by 6 ft., from which proceed three lines of cast-iron pipes, each 3 ft. 6 in. in bore, standing out from the shore into the entrance to Langstone Harbour a distance of nearly 600 ft., and have their open ends placed slightly below low-water mark, and delivering well into the tidal stream. The laying of these pipes has been a work of great difficulty and of some danger, owing to the swiftness of the tidal current and to the exposed nature of the shore at this point.

The arrangement for lifting the discharge valves in the tanks is of an ingenious kind, it is effected by the action of the sewage itself upon turbines which raise the valves. Thus considerable time and labour are saved, and I hope when we inspect you will direct particular attention to this point.

A long series of experiments were made under Sir Frederick Bramwell's directions during the winter and spring of 1883 and 1884 in all states of the tides, and during all sorts of weather, to determine, by means of floats, to what points the sewage would be taken, if delivered at the proper time from the new outfall pipes, and in every case in these experiments the floats were carried many miles to sea,—never approaching the shore: thus confirming Mr. Angell's selection of this point as the best in the borough.

The tank has been constructed with Portland cement concrete walls lined with brick set in Portland cement mortar, there being a straight, thick water-tight joint between the face of the concrete and the brick lining. The floor is in Portland cement concrete, worked to parallel inverts sloped towards the outlet culvert and "rendered." The roof is composed of brick arches carried on brick piers, and on the lining walls, with concrete backing to the haunches, the whole earthed over and sown with grass and clover seed. The discharge-culvert, and the flushing-culvert and the discharge-chamber, are of Portland cement concrete similarly lined with brickwork.

The height at which the tank is placed is such that the supply connexion to it from the pumping-station is under pressure, and thus the connexion between the two is made by a cast-iron main or pipe. In order to allow for the irregular flow of the sewage and of rain water, and so as not to sacrifice power by undue friction, this main, which is nearly 1,500 yards in length, has been made as much as 3 ft. 6 in. diameter of bore. The load on the new pumping engine is equalised, and accidents are guarded against by providing a standpipe in the engine-house premises, into which the sewage is pumped, and from which it passes into the cast-iron main. This is carried underground, generally parallel with the present brick outfall sewer, until a point is reached about 500 yards from the engine-house, when it runs to the N.E., so as to approach the tank at its N.W. angle, and is then extended along its west wall, being connected to the tank so as to fill all three compartments.

Having regard to the elevation of the tank, the whole of the sewage will have to be pumped, and having regard to the fact before stated that the sewage comes down in unequal quantities, and not by an average flow, and also that surface water has, to some extent, to be allowed for, the pumping power is very considerably in excess of that previously in use.

The two new pumping engines are each capable of developing 150 indicated horse-power. They are compound condensing beam engines, with cranks and fly-wheels, the pumps (two to each engine) being worked direct from the beam.

The pumps are double-acting plunger pumps, and draw from two sumps outside the engine-house. Into these sumps the main high-level and main low-level sewers fall, the invert of the high-level sewer at this point being about 15 ft., and the invert of the low-level sewer about 20 ft. below the surface of the ground. By an arrangement of sluice-valves on the suction-pipes it is possible for each pump of each engine to draw either from the high-level sump or from the low-level sump, or from both sumps together. The deliveries of the pumps lead to a stand-pipe, 24 ft. high from ground-level, and from this stand-pipe a cast-iron main, 3 ft. 6 in. in diameter, conveys the sewage to the collecting tank.

The general dimensions of the engines are,—high-pressure cylinders, 20 in. diameter, 4 ft. 6 in. stroke; low-pessure cylinders, 30 in. diameter, 6 ft. stroke; length of beams, 23 ft; stroke of cranks, 6 ft.; diameter of fly-wheels, 15 ft. The diameter of the pump plungers is 2 ft. 6 in., and the stroke, 3 ft. 3 in. The total displacement of the pumps of each engine, when running at twenty revolutions per minute, is about 500,000 gallons per hour, but a much less quantity than this only is pumped with the ordinary flow of sewage. The pump-valves are rectangular leather-faced clack valves on inclined seats. There are three suction and three delivery valves for each end of each pump.

The boilers, which are in a house adjoining the engine-house, are four in number. They are double-flued boilers, each 7 ft. in diameter, and 27 ft. long, set in the usual manner, the flues being connected to a circular chimney-shaft, 120 ft. in height.

The engines and boilers are by Messrs. James Watt & Co., of Soho, Birmingham.

The principal dimensions of the engine-house are:—Length inside, 40 ft.; width inside, 30 ft.; total height from basement to ridge of roof, 72 ft., of which 23 ft. is below floor-level. The roof, which is high-pitched, is partly supported on the two lattice "lifting girders," one of which is over each engine. On the lower flange of each of these girders is a small lifting carriage, which may be fixed in any position in the length of the girder by a brake-block taking against the bottom of the girder; to these lifting carriages may be attached blocks or other lifting tackle.

The existing engines have yet to be altered so as similarly to receive their pumping supply from the high and low level sewers, and to deliver into the new outflow main. When the whole scheme is completed the two new engines, or one of the new engines in conjunction with the existing engines, will suffice for the work, thus giving a stand-by engine to go to work when needed.

The engines, or one of them, will be kept continually at work, night and day, from one year's end to the other, so that the sewage will be taken away to the collecting-tank as it arrives at the pumping-station, and will not be allowed to "back" up in the sewers of the town, as it now does for hours together; thus all evils attendant upon the present state of things will, it is believed, gradually disappear.

A large amount of reparation and renewal of the sewers in the borough has also been done during this last four years, but much has yet to be performed, and there is no doubt but what, as soon as the new scheme is put into operation, a systematic flushing of the sewers and drains will have to be commenced in order to put them into a satisfactory condition.

To convey some idea of the magnitude of the works which have been performed, it may be stated that about two hundred thousand cube yards of earth have been excavated, some of which has, of course, been refilled in over the work; nearly six million bricks have been used; seven thousand tons of Portland cement, for the making of concrete and mortar, with about thirty thousand tons of gravel and eight thousand tons of sand; altogether also there will be something like three thousand tons of iron, of which about 350 tons, more or less, will be in the engines and boilers, and pipes, &c., in connexion with these, the remainder being in the cast-iron main from the pumping-station to the tank, in the outlet pipes into Langstone Harbour, and in the screw piles, &c., for securing these, and in the valves, covers, and plates, &c., throughout the works.

In conclusion, I need scarcely tell you that this is only a mere sketch of the large works which have been carried out. I hope to be able to furnish a more detailed account of them to be entered in our Minutes of Proceedings, but I felt that a longer paper would only have detained you from the inspection, and my intention was to give you only a short outline of the principal points of the work, so that you should more clearly understand them when you visit them, which I now ask you to do.

The members subsequently visited the pumping-station and outfall works, and after being entertained at luncheon by Mr. John Mowlem Burt (of the firm of John Mowlem & Co., the contractors for the works), inspected the Corporation stables, the new public baths, and the new Town-hall now in course of erection. As to the latter we will say something in our next.

New Underground Railway at New York.—In view of the ever-increasing railway traffic, but more especially the demands for further facilities for local travelling in New York and its suburbs, it is stated that the New York Central Railway Company has determined to undertake an enterprise almost as great as the construction of the Fourth Avenue line to Harlem a few years back,—a work which cost something like 7,000,000 dols., or 1,400,000*l*. The new project is that of an underground railway, about three miles and a half in length, from the Grand Central Depôt, in Forty-Second-street, to Brooklyn Bridge. The course of the tunnel will be under Elm-street, which in consequence will have to be considerably widened and extended at one end to the bridge, while the other end will be lengthened to Lafayette-place and Fourth-avenue, and no pains or money will be spared to accomplish the undertaking as soon as possible. It is calculated that the railway will be completed and opened for public traffic a year next autumn, or about sixteen months from the present date. There will be four lines, two of which will be employed for through travelling. The company has not stated how or when they obtained from the city or the Legislature the authority to appropriate the streets for the purpose of a railway, and on this account it is presumed in New York that the authorities are acting in accordance with the New York Central original charter (known to be a very elastic one), allowing the company the right to extend their lines in almost any direction, and to any distance at any moment. Under any circumstances, however, the new line cannot fail to be a very appreciable acquisition to the general public.

Obituary.—We regret to hear of the death of Mr. Caleb Holden (of the firm of Holden & Co., contractors for zinc roofing, &c.), which took place very suddenly at Wood-street, Westminster, on the 13th ult. Deceased was in his seventy-third year.

CASE UNDER THE METROPOLITAN BUILDING ACT.

AT the Lambeth Police Court a few days since, Mr. W. A. Smee, of 89, Finsbury-pavement, builder, was summoned by Mr. George Elkington, jun., the District Surveyor for Penge, for not giving notice of his intention to build a tobogganing slide, erected by him at the Crystal Palace, contrary to 18 and 19 Vic., c. 122, sec. 38. Mr. Thomas Burton, solicitor, instructed by the Metropolitan Board of Works, appeared for the District Surveyor, and Mr. Wildey Wright for the defendant.

Mr. Burton stated the defendant had erected a slide 456 ft. long, and attached thereto was an engine-house for bringing up the unused sleighs, a store-room, and a ticket-office, and these he considered formed a building within the meaning of the Act, and, therefore, required notice to be given to the District Surveyor, and that he relied upon the case of Stevens *v.* Gourly in support, and called Mr. Elkington, who proved the dimensions of the various buildings.

Mr. Wildey Wright contended that the slide was not a building, and that if it was it was exempted under the Special Act of the Crystal Palace, 44 Vic., c. 36, sec. 21, which enacted that the main buildings, conservatories, and waterworks, and the conveniences and other works immediately connected therewith, were to be exempted from the operation of Part I. of the Building Act.

Mr. Byron said he should find that the slide was a building, but was exempted under the Crystal Palace Act, and dismissed the summons.

Notice of appeal was given.

RECONSTRUCTION OF THE STRATFORD RAILWAY STATION.

AMONGST the several costly new works which the Great Eastern Railway Company are at present carrying out at several points of their system is the entire reconstruction and enlargement of the station at Stratford. One of the most difficult portions of the engineering connected with the undertaking has been the designing and construction of the underground approaches to the different platforms above from which the trains are dispatched from Stratford to the many suburban and other localities embraced in the Company's system. In consequence of the peculiar conformation and levels of the station area, these platforms are, in several instances, only reached by underground subways. The reconstruction of the whole of these subways, together with staircases leading up from them to the platforms above, has been accomplished without any interruption to the traffic on the line. The subways are all about 12 ft. in width, and are light and airy, the walls being faced with white enamelled brick, and covered in with wrought-iron roofs immediately under the railway metals above. A feature in the carrying out of the works is an improvement which is being made in the approaches to the station from different parts of the town. In place of the former inconvenient approach from the Broadway, on the south-east side of the town, a new block of booking-offices and waiting-rooms has been erected at this point, approached direct along one of the main thoroughfares from Broadway, from which the platforms are reached along the subways and staircases already referred to. At the north-west side of the town, from the locality known as Stratford New Town, a carriageway, about 40 ft. in width and upwards of 900 ft. long, is being formed on the street level. This carriageway leads to a spacious open area immediately in front of an extensive block of new booking-offices, waiting, and refreshment-rooms, station-master's offices, and other apartments, which are at present in course of construction. Several of the platforms approached from these new booking hall and offices are reached without the aid of the subways, the floor of the offices being on the railway level. All the platforms are from 800 ft. to 900 ft. in length, and are intended to be covered with iron roofs. Immediately opposite to the booking-office block, another block is also in progress of construction, intended as general offices for the clerks and other *employés* of the company. The works are in the main being executed by the company's own workmen under the superintendence of Mr. Wilson, engineer-in-chief, and his assistants; the brick-work of the several new blocks of office and other buildings being in the hands of Messrs. Atherton & Latta, builders, of Poplar. It is stated that the works when completed will have cost from 200,000*l.* to 250,000*l.*

IMPROVEMENTS IN RAIN-WATER SEPARATORS.

WE have on two or three previous occasions noticed the ingenious rain-water separators invented by Mr. C. G. Roberts, of Haslemere, and we return to the subject in order to mention some material improvements lately made in those appliances.

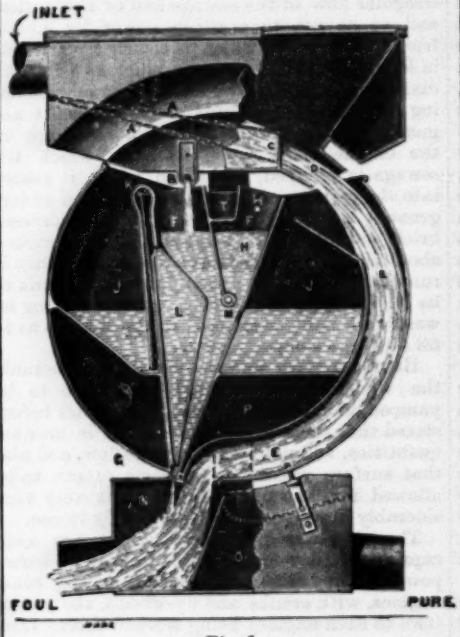


Fig. 1.

In order to insure a thorough washing of the roof, it is deemed desirable by the inventors that in a smoky town no water should be stored before two gallons of rain have fallen on each 100 square feet of the roof; in other localities, one gallon or 1½ gallon of rain on each

Fig. 2.

100 square feet will be enough to wash it. By the insertion of a slide marked "1," "1½," or "2," the requisite amount of washing for each locality was secured in the old form of the appliance, and the separator was canted as soon as that amount of rain had fallen, whether it came in five minutes of storm or in sixty minutes of steady rain. There was comparatively little difficulty in securing the automatic action with heavy rain, but it was more difficult to ensure an unfailing action in light rains that took an hour to yield the requisite quantity, and until recently all the water that came in still lighter rains was of necessity allowed to run to waste. By the recent improvement it is claimed that perfect regularity of action is obtained in much lighter rains, and that in a town the separator with the slide marked "2" will be certain to run water to storage as soon as two gallons have fallen upon each 100 ft. of roof, even if it has occupied two hours' time in descending. This improvement is effected by the introduction of the funnel-shaped chamber, H, shown in the two accompanying illustrations. Fig. 1 gives a section of the horizontal separator, and fig. 2 a section of the vertical separator. While the inlet and outlet boxes differ, it will be seen that the centre part, or canter, which turns upon the pivot M, is the same in construction in each drawing, but different in position. Fig. 1 shows it before it has canted and while it is still running foul water to waste. Fig. 2 shows it after it has canted and is running the clean water to storage. In the earlier form of separator (see illustration in *Builder* for April 10, 1886) the water that came through the slide B fell direct into a large chamber, with a hole at the bottom of it rather smaller than the hole at B, and as soon as this chamber filled to a certain height the centre canted. In the new form of separator, the water from B falls into the funnel F, and only a small proportion passes thence by the holes H into the chamber J. There is no aperture at the bottom of this chamber, but when the rain has ceased it is emptied by the action of the siphon L. It will be noticed that the longer leg of the siphon has been enlarged; by this very simple and, as it is believed, original contrivance, the air in the top of the siphon is prevented from interfering with its action, being made to take the shape of a short and broad instead of a long and narrow bubble.

ARTERIAL DRAINAGE.

SIR,—As my grandfather, the late Mr. John Grantham, sen., reported to the late Mr. John Rennie in 1822, on the condition and improvement of the river Shannon, and his report was printed by the then Government, and as my father, Mr. R. B. Grantham, and I have since carried out many works of arterial and agricultural drainage in this country, perhaps you will kindly allow me space for a few remarks on the subject of your leading article on "Arterial Drainage in Ireland."

In the first place, the opinion of the Royal Commissioners appointed in October, 1886, that the climatic conditions arising from large tracts of wet land cannot fail to have effects prejudicial to health, will be supported by all who have had experience of lands liable to frequent inundation. In 1873, a report made by my father, and presented to the House of Commons by the Inclosure (now the Land) Commissioners, upon the floods in certain valleys in Somersetshire, which were very severe at that time, contained the following passage:—"The results of my inquiries among the medical men of the country show that during the wet weather of last winter the public health was generally good, but that ague set in early in the spring, and is now very prevalent on the verge of the moors. Neuralgia in various forms prevails, and is attributed to the malarious exhalations of the moors. These diseases cause a decided vital depression and diminution of energy for work, and are a source of affliction to the poor, preventing men from working and driving them to seek parochial relief. Rheumatism is generally prevalent in the neighbourhood at all times of the year." The floods in the districts referred to extended over an area of 69,000 acres in the valleys of the Rivers Parrett, Brue, Axe, Tone, and Carey, the aggregate watershed of which amounted to 609,000 acres.

I cannot but think that the recommendation by the Royal Commissioners of the adoption of the principle of a Conservancy Board for the control of the main river (in the case of the Shannon, represented by the Government), with District Boards for the management of the tributary rivers, will be hailed with satisfaction by all those interested in the conservancy of rivers; and that their apportionment of the rating powers over the lowlands, midlands, and uplands of a watershed will be regarded by many people with approval.

It is perhaps not very generally known that

the principle of Conservancy Boards has to a limited extent been already established in the upper Thames Valley, and in the Somersetshire valleys already mentioned.

In 1871, the Thames Valley Drainage Act was passed, and this Act appointed a body of Commissioners, with jurisdiction over the valleys of the river Thames and its tributaries above Oxford. The area under their control was divided into seven districts, each, or a combination of them, having its separate District Board. The operations of the Commissioners themselves were confined to the beds, soil, and banks of the River Thames, and its tributaries, while the District Boards were to maintain and improve the internal drainage of their own districts, always, however, submitting their plans to the Commissioners. After the appointment of the first Commissioners the District Boards could elect Commissioners from their own body. The first Commissioners were directed to ascertain all lands which would derive benefit from the exercise of their powers, and those subsequently elected were to levy rates according to the probable or actual improved value of the lands within their jurisdiction.

The flooded areas in the Thames valleys previous to 1871 amounted to 71,100 acres from an aggregate watershed area of 826,900 acres.

An Act similar to the Thames Valley Drainage Act was passed in 1877 having for its object "the more effectual drainage and irrigation of lands in the county of Somerset and for other purposes." This Act referred to the valleys in Somersetshire previously alluded to.

Both Acts were initiated by those interested in the land in their respective valleys, and under both of them considerable works of improvement have been carried out. It will be seen that they embody the principle of Conservancy Boards, although their methods of rating are not those proposed by the Royal Commissioners.

As the report of the Royal Commissioners refers to the Fens in Lincolnshire, and as I am acquainted with the system of rating in one of the districts there, a short description may be of interest.

The jurisdiction of the Black Sluice Commissioners extends from Boston up to the river Glen, over an area of about 70,000 acres, drained by what is known as the South Forty-foot River. The district does not extend beyond the fen lands, and therefore does not include any uplands, and it is upon the fen lands within the district that the rate is levied, and this rate provides for the maintenance of the South Forty-foot River and of all streams bringing down water from the high lands so far as those streams lie within the Black Sluice District. Those streams generally have straight courses, and discharge at right angles into the South Forty-foot River. Between those streams lie the fens, each within its own parish, and discharging its drainage by what are called "interior" drains, through sluices, into the Forty-foot. For the proper drainage of each fen "interior" officers are annually appointed by the Black Sluice Commissioners, and have the power of rating for that purpose; so that, besides the Black Sluice rate, there is also the "interior" rate, on each fen. The system appears to work fairly well, although there is difficulty sometimes in getting the "interior" officers to maintain the "interior" drains in proper condition.

I fear I have made this letter too long already, but I woould add that, with regard to the question of embanking, as compared with deepening the channels of rivers, it appears to me impossible to form a judgment without a close investigation of every case, although, no doubt, the deepening of the channel, as a question of principle, is the method to be preferred.

RICHARD F. GRANTHAM, M.Inst.C.E.

Northumberland-avenue, June 4.

Temple Bar.—The *City Press* says that the statement which we quoted last week from the *Pall Mall Gazette* to the effect that the Corporation are about to sell the stones of Old Temple Bar, to be erected in private grounds, is a *canard*. As a matter of fact, no decision has been come to with regard to the disposal of the stones. The subject is still under the consideration of the City Lands Committee, and nothing can be done without the sanction of the Court of Common Council.

LIFTS.

SIR,—In your issue of May 21st there is a communication from Messrs. Archibald Smith & Stevens which had escaped my attention until now, and which requires a word of reply. With much of that which is written by Messrs. Smith & Stevens I fully agree, but they have fallen into an error. They express a wish to show Mr. Slater "Lifts of English manufacture which comprise all the precautions he enumerates, and from which the second danger he ascribes to the Otis lift is absent. The English lift, being absolutely controlled by its valve, cannot run down if overloaded; in it overcrowding must be carried to the fracturing point before danger can arise."

Mr. Slater did not ascribe any danger to the Otis lift. On the contrary, not only in the course of his remarks, but in the discussion after his paper had been read, absolute safety was in the most explicit terms conceded by him. The statement that "the English lift, being absolutely controlled by its valve, cannot run down if overloaded," might be taken by the unwary reader as meaning by implication that the Otis lift could run down if overloaded. Such an idea needs no words from us with any who understand the matter. If all your readers were engineers and acquainted with lift machinery, we should not deem it necessary to trouble you, but for the benefit of such of your readers as have not gone into a critical investigation of this matter, we desire simply to correct the wrong impression calculated to be produced by Messrs. Smith & Stevens's letter. WM. AUG. GIBSON,
President American Elevator Co.

*** Our correspondent is not quite correct: Mr. Slater did say that a lift on the Otis principle was exposed to three dangers. He then went on to point out that these possible dangers had been completely guarded against. The expression used by Messrs. Smith & Stevens was verbally accurate; but it was, no doubt, liable to be misunderstood.

THE JUBILEE HOLIDAYS.

SIR,—Perhaps it may not be out of place to ask what the general holiday will be in the building trades as regards us clerks. I am afraid some of our firms, not knowing other firms' intentions, may only give us the day, and a lot of us will lose the chance of an extra day or two entirely through our principals' ignorance as to what is to be the general rule.

I think, myself, that we ought to have the three days, viz., Monday, Tuesday, and Wednesday, and those clerks who are not entitled to any regular summer holiday should have the week.

I hope that some of our leading firms will take this matter up and let us know their intention in your next issue. A BUILDER'S CLERK.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

7,069, Flushing Water-closets, &c. W. Smeaton, sen.

The object of this invention is principally to limit the quantity of water used for flushing the closets. The apparatus is actuated by the movement of the seat, or in the case of lavatories or urinals by a foot-plate.

8,081, Casement Fasteners. F. A. Morgan.

By this invention the casement is secured to the frame by a screw grip. On the plate affixed to the casement two legs are formed; between these is a joint with one end of a screw. On the other part of the screw is placed a thumb nut, and on one side of this thumb nut is formed a boss. A slotted plate fixed on the casement-frame is jointed so that it can be folded like an ordinary butt hinge. The action is such that when closing the casement the jointed screw of the plate fixed on the casement is brought into the slot of the plate which is fixed on the casement-frame.

8,593, Wall Paper, &c. John Luke.

According to this invention the paper is treated in a special manner in order to render it more durable and suitable for use as a covering for walls, floors, &c. A duplex paper prepared after a formula given in a previous specification is passed before finishing through a sizing machine, in order to give it a coat of size, after which the paper is made waterproof by means of paint or oil. It is then printed with any impressed pattern and dried by heated air or some such like process.

12,331, Firegrates. C. Swindell.

Instead of the ordinary horizontal bars, wire of zigzag pattern is, according to this invention, passed from the top to the bottom bar, and laced so as to prevent the fuel from falling out.

15,904, Wood Block Flooring. R. Davison and W. T. Creed.

According to this invention, the blocks are bonded on all sides. What are called by the inventors "wood-keys" are used. The blocks have dovetail joints worked on two or more sides, and have recesses into which the aforesaid "wood keys" are inserted. The bed is made in the method common to wood-block flooring, and it is claimed that the block flooring gives a perfectly level and well-bonded floor.

3,850, Shop Fronts. J. Gooch.

By this invention a wheeled or movable arrangement is made so that goods may be better displayed, and so also that the frontage between side and party walls may be better utilised for the display of goods.

NEW APPLICATIONS FOR PATENTS.

May 27.—7,696, W. Heys, Ventilating Fans.—7,708, N. Foster, Kilns and Drying Floors for Cements and Limes.—7,757. C. Rabitz, Construction of Walls, Ceilings, Roofs, &c.—7,767, A. Clark, Window-sash Fastener.

May 28.—7,774, G. Nussbaum, Flushing Apparatus for Water-closets, Drains, &c.—7,777, W. Phillips, Pivot for Windows, &c.—7,808, L. Sunter, Screws and Screwdrivers.—7,810, C. Irwin, Augerbits.

May 31.—7,846, J. Anderson, Dovetailing Machines.—7,855, W. Dickson, Cooking Ranges.

June 2.—7,959, G. Levis, Flooring, Wainscoting, &c.—7,965, J. Ogg, Cutting and Dressing Stone, &c.—7,966, W. Boelling, Inlaid Floors.—7,970, A. Eastlake, Sash Fasteners for Windows and Casements.—7,976, W. Haworth, Chimney Pots.

PROVISIONAL SPECIFICATIONS ACCEPTED.

2,685, R. Adams, Door-closing Appliances and Checks.—4,683, B. Holmes, Fastening for Windows and Doors.—6,027, A. Rhodes, Window Fastener.—6,048, Attaching Door-knobs to Spindles.—6,256, W. Kneen, Door Latches, &c.—6,582, P. Molyneux, Paint.—6,616, L. Marguerie, Vitreo-Metallic Material for Glazing, &c.—6,887, J. Jackson, Water-waste Preventing Syphon Cisterns.—7,057, T. Boothroyd and S. Brooke, Ventilator.—5,732, J. Martin, Pans and Seats of Closets.—5,828, J. Ward and W. Jones, Window-sashes.—6,122, H. Wake, Machinery for Lowering and Depositing Concrete under Water.—6,513, A. Itter, Facing Bricks, Tiles, &c.—6,548, S. Fisher, Wall or Ceiling Coverings.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

9,987, T. Whitaker, Pile-driving Machines.—6,075, F. Tuerk, jun., and Others, Water Meters.—6,494, L. Sagendorph, Sheets for Metallic Roofing.

The Sunday Society.—On Saturday afternoon the twelfth public annual meeting of the supporters of the Sunday Society was held in the Freemasons' Hall, Great Queen-street. Sir George A. Macfarren, Mus. Doc. (President of the Society), took the chair. There were about 200 persons present. Mr. Mark H. Judge (the Hon. Sec.) read the annual report. Mr. Judge, in the course of his statement, said that it was twelve years since the society had been inaugurated, and each year some progress had been made. The Society of British Artists, the Institute of Painters in Oil-Colours, and the Grosvenor Gallery had all been opened on one or two Sundays during the past year. The Chairman then proceeded to deliver his presidential address, after which the Rev. Septimus Hansard (Rector of Bethnal-green) moved the first resolution, accepting the report as eminently satisfactory, and authorising the Chairman to sign a petition to Parliament in favour of Sir Henry Roscoe's motion for the opening of public museums. Mr. Oscar Wilde seconded the resolution, which was then unanimously carried. Mr. George Godwin, F.R.S., proposed the second resolution, expressing gratification that Her Majesty had signalised the jubilee year of her reign by opening the People's Palace,—the first great institution in the metropolis to be opened on Sundays,—and urging that in further commemoration of the event a memorial should be presented to the President and Council of the Royal Academy requesting them to solicit the sanction of the Queen to the opening of Burlington House on Sundays before the close of the present exhibition. He said that the Sunday opening of public institutions was now merely a matter of locality, for the principle had been conceded in many of the large provincial towns. It was stated that Sunday opening would be an unfair call upon the curators and officials of the museums and galleries, but it was a fact that many of the curators themselves were earnestly in favour of the change. Mr. Thomas Powell (of the London Trades Council) seconded the resolution, which was carried unanimously.

Ecole des Beaux Arts.—Some American architects, to mark their sense of gratitude for the training they have received at the École des Beaux Arts at Paris, have presented a sum of 35,000 francs to found a prize, for French students exclusively, of architecture at the school.—*Athenæum.*

DOERING'S GIMBAL JOINT TRIPOD HEAD

FIGURE 1

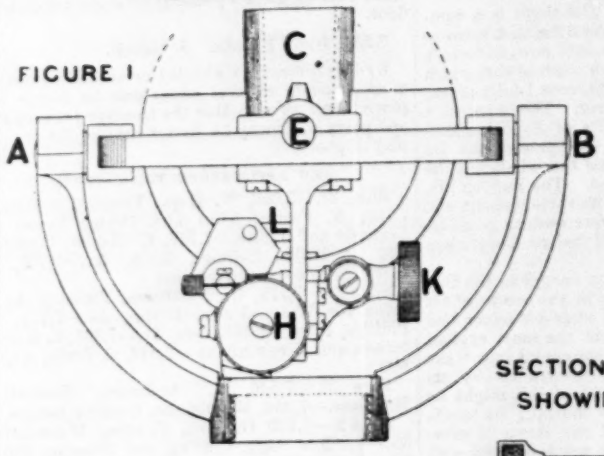
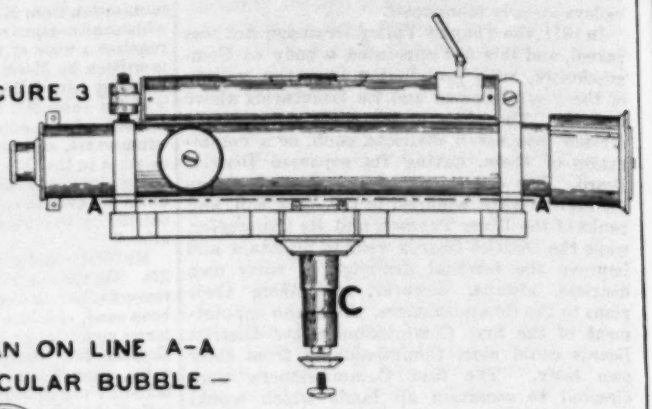


FIGURE 3



SECTIONAL PLAN ON LINE A-A SHOWING CIRCULAR BUBBLE —

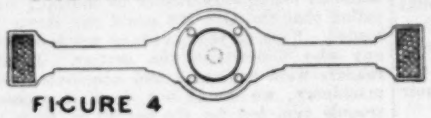


FIGURE 4

FIGURE 2

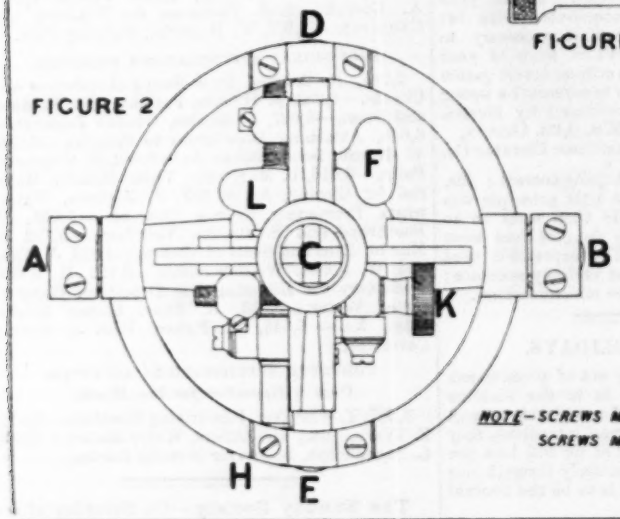
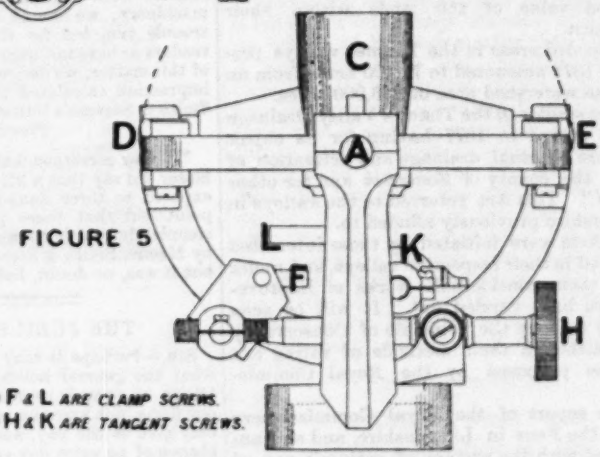


FIGURE 5



NOTE—SCREWS MARKED F & L ARE CLAMP SCREWS.
SCREWS MARKED H & K ARE TANGENT SCREWS.

The Student's Column.

FIELD WORK AND INSTRUMENTS.—XXIV.

Levelling Instruments.

X.—DOERING'S LEVEL.

ANOTHER form of gimbal-joint action in a tripod head is that shown in figures 1, 2, and 5, illustrating Doering's level. This method of supporting a levelling telescope is similar to the system adopted for a ship's compass, with the addition of vertical arcs at right-angles to one another respectively, which are clamped to each other by the thumb-screw marked L, and by the thumb-screw marked F to the frame which is fastened upon an ordinary tripod stand. In the field when setting up the instrument, should the ground be very uneven, the legs of the tripod can be put down anywhere in the most convenient manner, irrespective of level, and the telescope afterwards adjusted by moving the vertical arcs which connect it with the tripod stand. Fig. 3 illustrates the telescope, the vertical axis of which is connected at C in the socket bearing shown in elevation in figs. 1 and 5. As shown in fig. 4, a central circular bubble is substituted for the ordinary transverse bubble. Figs. 3 and 4 are here drawn to half the size to which figs. 1, 2, and 5 are drawn: hence the socket-bearing marked C in figs. 1, 2, and 5 appears double the diameter indicated by figs. 3 and 4. Fig. 2 shows in plan the relative positions of the elevations illustrated by figs. 1 and 5.

In setting up the instrument upon irregular ground, the clamps marked F and L which hold the telescope rigidly to the tripod stand are first slackened and the longitudinal bubble is set approximately level by hand. The clamps F and L are then tightened and the final adjustment made by the two milled-headed tangent screws marked H and K working in directions at right angles to one another. These screws are connected respectively to each arc at the clamps, as shown in figs. 1 and 5. Should the ground be moderately level and firm, it is unnecessary to unclamp the vertical axis of the joint. The instrument is first set up approximately level in the ordinary manner by the legs and brought to a perfect adjustment for taking levels by means of the tangent screws.

The substitution of the gimbal joint tripod head for parallel plates enables the telescope to be rapidly set level in rough country, but it has a greater area exposed to the action of the wind, and more wearing surfaces. In adjusting the telescope by the gimbal joint, after fixing the legs firmly in the ground, the telescope should be held round the body beneath the compass-box, before the clamps are slackened. One of the arcs may be divided into degrees for measuring vertical angles, if desired.

It is stated that Huygens, in the seventeenth century, was the first to apply a telescope to an instrument which was set up level by means of a plummet, and that Dr. Hooke was the first to apply an air-bubble to an instrument for setting a line of sight in a horizontal direction. Later on, M. Le Bion combined the telescope of Huygens with the air-bubble of Dr. Hooke. The introduction of parallel plate-screws was the invention of Sisson, prior to which all instruments were adjusted by a ball-and-socket joint. The clamp and tangent screw movement for traversing small distances was originally suggested by Ramsden. The inventor of the circular bubble is not known, but it is certain that it was employed in the early part of the eighteenth century, upon surveying instruments known as plane tables. The transverse bubble used to facilitate the approximate setting up of the instrument was the idea of Mr. Gravatt. Messrs. Troughton & Simms, Messrs. Elliott, and other well-known makers have also made several improvements in the detail arrangement of the various parts of the instrument. The annexed illustration is taken from one of Messrs. Elliott's patterns, at whose works in London several different forms of instruments are kept in stock.

Association of Municipal and Sanitary Engineers and Surveyors. — A Midland Counties District Meeting of this Association is to be held at Kidderminster this Saturday, June 11. Members will assemble in the Council Chamber, Town Hall (by kind permission of the Mayor), at 11 a.m., when several papers on the sanitary works of Kidderminster will be read and discussed.

CHURCH-BUILDING NEWS.

Coventry.—St. Michael's Church, Coventry, was lately re-opened, after partial restoration (a work still in progress), under the direction of Mr. John Oldrid Scott. It seems that in 1883 a fruitless effort was made to induce the Coventry Corporation, as lay impropriators, to repair the chancel. In June, 1884, a scheme of restoration was launched, the estimated cost of which was 35,000*l*. Mr. George Woodcock started the subscription list with a donation of 10,000*l*., and a formal appeal to the public was made. On Christmas Day the same year, the Vicar announced that the restoration fund amounted to 30,335*l*. Early in the following year Mr. Scott was instructed to prepare the necessary plans, and a contract for the execution of the greater part of the work was entered into with Mr. John Thompson, of Peterborough, for 31,853*l*. The work was commenced in June the same year, and the portions which are completed and which were lately opened on Sunday, are the nave, chancel, sanctuary, and south aisle. The re-casing of the tower and the other departments of the work are being steadily proceeded with. A new organ has been built by Messrs. Henry Willis & Sons, London. With regard to the tower, one of the first things undertaken was the underpinning of the foundations, and since this was done no movement on the part of the steeple has been detected, and it now rests perfectly secure on the new foundations. Its symmetrical lines are hidden by the scaffolding surrounding it on every side, and the removal of 54 ft. of the upper masonry, which was exceedingly insecure, gives to it a rather stunted appearance at present. About 5,000*l*. more than has been yet subscribed is required to complete the work now in hand.

Egg Buckland (Devon).—A new reredos has just been placed in St. Erasmus's Church, Egg Buckland. It is the gift of Mr. James John Elliott, of Leigham, and is the work of Mr. Harry Hems, Exeter. It is Perpendicular in style, the architectural framework of Beer stone enclosing a sculptural representation of "The Last Supper," carved in high relief in fine-grained Caen stone. Mr. Hems has also executed a statue of St. Erasmus, which has

been placed in the niche above the south-west porch.

Failand.—The new church at Failand, an outlying district of the extensive parish of Wraxall, has been opened under licence of the Bishop of Bath and Wells. This church, which is a chapel of ease to the ancient parish church of Wraxall, has been erected, together with a residence for the curate, at the sole cost of Mr. Richard Vaughan, elder brother of the present rector of Wraxall, from designs furnished by Mr. Edward Barnes, architect, of Bristol, the builders being Messrs. Newton & Co., Wraxall. The building comprises nave, transept, chancel, and porch. The spire is 120 ft. in height. The seats are of solid oak, and there is a reredos and a pulpit of varied stone and marbles. All the windows are of stained glass. The large one at the east end, the two rose-windows, and those at the sides of the church, have been supplied by Bell & Son, of College-green, Bristol.

Guyhirn.—In excavating, a few years since, for the new church here, the foundations of the supposed original Norman church were brought to light, and numerous fragments of early Norman work, such as capitals and mouldings, were found embedded in the foundations. The Rev. W. Carpenter, the vicar, had them carefully removed, and taken care of, with the view of having a cross erected in the churchyard in commemoration of the erection of the new church and parsonage. The cross (the design of which has been entrusted to Mr. W. Adams, architect, of King's Lynn) is early Norman in character, 10 ft. high, with a base 4 ft. square, which will be surmounted with a new cross of elaborate design. The four sides of the cross will have recessed panels for inscriptions, and sun-dial with arch mouldings springing from clustered shaftings.

Leek (Staffordshire).—St. Mary's Church, Leek, which was opened on the 12th ult., is finished complete in every respect, and is erected on the local rock in the Early Decorated style of architecture, from the designs and under the superintendence of the architect, Mr. Albert Vicars, of London. It is faced with local coursed rubble, with Doulting stone dressings, the spire being visible from nearly all parts of the town. The plan consists of nave and two aisles, sanctuary arranged for surpliced choir, two side chapels, baptistery, nuns' choir, priests' sacristy, working sacristy, organ gallery, confessional with priests' room communicating, and heating-chamber under. The interior length of the church is 103 ft. 9 in., the width 50 ft., and the height to the apex of the nave ceiling 53 ft. 3 in., and to the ridge 64 ft. The ceiling is of yellow pine, panelled, and has moulded ribs and stop-chamfered principals, every alternate one being cusped and supported on red stone wall shafts with carved caps and moulded bases. The columns in the nave and sanctuary, and the shafts to the chancel arch, are of red Scotch stone, with Portland stone carved caps and moulded bases. The spire is built of Doulting stone, with red stone bands at intervals; its height is about 150 ft. above ground level. On the east side of the tower there is a large stone statue of the Blessed Virgin, standing under a canopy upon a moulded and carved corbel. The floor of the church has been laid by Messrs. Duffy & Son with their prepared wood block paving. The stained glass is by Messrs. Mayer & Co., of Munich and London. The vane to the spire and the wrought-iron gates and railings have been supplied by Messrs. Brawn & Co., of Birmingham, and Messrs. Barker & Son, of the same town, were the contractors.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

MAY 23.

By JOHN LEES.

Horley—The freehold residence, Lumley House, and 5a. 2r. 14p.	£1,260
Freehold enclosure of land	265

MAY 31.

By RICH BROS.

Deptford, Lower-road—No. 162, 61 years, ground-rent 4*l.*	920
174, 180, and 178, Deptford Lower-road, 61 years, ground-rent 12*l.* 7s. 6d.	1,730
1 and 2, Cope-street, 61 years, ground-rent 2*l.*	415

By DALE & SON.

Hackney—80 and 82, Mare-street, copyhold	2,020
North Row—Ground-rents of 17*l.* 2s., reversion in 52 years	450
Ground-rents of 20*l.* 18s., reversion in 52 years	375
Limehouse—60, Samuel-street, copyhold	210
Mile End—84 and 86, Rutland-street, 10½ years, ground-rent 4*l.* 6s. 6d.	155
90 and 92, Rutland-street, 11½ years, ground-rent 7*l.*	£170
17 and 18, Smith-street, 26½ years, ground-rent 5*l.*	510
31, Fair-street, 39 years, ground-rent 2*l.* 10s.	205
St. George's-in-the-East—95 and 97, Grove-street, 15 years, ground-rent 4*l.*	140
Bethnal Green—99, Approach-road, 67 years, ground-rent 5*l.* 5s.	460
Selhurst—1 to 5, Elgin-terrace, 75 years, ground-rent 30*l.*	715
Norwood—The residence, Melrose, 58 years, ground-rent 10*l.* 10s.	535
Poplar—1 to 4, England-row, freehold	920

JUNE 1.

By ST. QUINTIN & SON.

Spitalfields—36 and 38, Hanbury-street, freehold	1,010

By BAXTER, PAYNE, & LEPPER.

Bayswater—Ground-rent of 28*l.*, term 56 years	500
Keston—A plot of freehold land, 1a. 1r. 9p.	100
Two plots of land, 6a. 3r. 22p.	450
A plot of land, 6a. 3r. 26p	390
A plot of land, 25a. 0r. 6p.	740
West Wickham—Ground-rents of 30*l.*, reversion in 94 years	640
Four plots of freehold land	500
A plot of freehold land	110

By H. DONALDSON.

Holloway—33 and 39, Mildmay Park, freehold	1,820

By BUST & FRY.

Fitzroy-square—45, Whitfield-street, 13 years, ground-rent 11*l.*	380
Bedford-square—60, Huntley-street, 38 years, ground-rent 34*l.*	400
Richmond—6, Townshend-terrace, 62 years, ground-rent 3*l.* 10s.	270

By JOHN LEES.

Reigate, Crescent-road—A plot of freehold land	470
Holmesdale-road—Two freehold cottages	405
Chart-road—Freehold residence, with armoury	500

JUNE 2.

By SEDGWICK, SON, & WEALL.

Watford—Freehold meadow land, 4a. 1r. 32p.	570

By W. F. NOKES.

Barnsbury—39 and 41, Copenhagen-street, freehold	885
29H, Victoria-street, freehold	205

By C. W. MILLAR.

Chelsea—4, Halsey-street, 56 years, ground-rent 5*l.*	545
5 to 10, Wood-street, 13 years, ground-rent 15*l.*	770
70, College-street, 22 years, no ground-rent	600
Dorset-square—12, Boston-street, 21 years, ground-rent 5*l.* 17s.	325

By WORSFOLD & HAYWARD.

Buckland, near Dover—Erith Cottage, freehold	1,000
7, Pleasant-row, freehold	120
43, Chapel-place, freehold	155
244 and 245, London-road, freehold	355
Dover, 37, Military-road, freehold	350

JUNE 3.

By D. L. GOOCH.

Hornsey—Ground-rents of 124*l.* a year, reversion in 94 years	2,880
Peckham—Ground-rents of 32*l.* a year, reversion in 98 years	730
Lewisham—Ground-rents of 11*l.* a year, reversion in 94 years	250
Ground-rents of 19*l.* a year, reversion in 93 years	415

By BAKER & SONS.

Roxeth, London-hill—Three freehold cottages	310
Greenhill—Copyhold cottage and garden	175
Wealdstone—A plot of freehold land	55
Camberwell—3, 4, and 5, Harris-street, 12½ years, ground-rent 28*l.*	30

By ROBERT REID.

Soho—47, Gerrard-street, freehold	1,800
Camberwell—38 and 40, Wyndham-road; twelve cottages in Mayhew Buildings; and 45 to 49, Beckett-street, freehold	1,050
42 to 46 even, Wyndham-road, and 50 to 53, Beckett-street, freehold	970
48 and 50, Wyndham-road, and 54 to 57, Beckett-street, freehold	870
52 to 68 even, Wyndham-road, and 58 to 72, Beckett-street, freehold	2,885
1a, 1 to 20, Beckett street, freehold	1,350
21 to 38, Beckett-street, freehold	1,390
34, 36, and 38, Crown-street, freehold	480

By W. HALL.

Baker-street—11 and 13, Crawford-street, 17 years, ground-rent 22*l.* 10s.	950
Kentish Town—1, Willow-walk, 39 years, ground-rent 32*l.*	85
41, Highgate-road, 6 years, ground-rent 5*l.* 5s.	155
North Kensington—15, Rendell-street, 99 years, ground-rent 7*l.* 10s.	350
16 and 26, Wheatstone-road, 88 years, ground-rent 15*l.*	530
30 and 32, St. Katherine's-road, 73 years, ground-rent 8*l.*	325
Harrow-road—146, Kensal-road, 72 years, ground-rent 7*l.* 10s.	260
North Kensington—3, Murchison-road, 90 years, ground-rent 7*l.* 10s.	150
Camden-road—70, King's-road, 34 years, ground-rent 5*l.*	500
17, Rochester-place, 34 years, ground-rent 4*l.*	415

MEETINGS.

SATURDAY, JUNE 11.

Architectural Association.—Visit to Banstead Park, the residence of the Hon. Francis Baring. (See advertisement on p. xvi.)

Association of Municipal and Sanitary Engineers and Surveyors.—Midland Counties District Meeting at Kidderminster.

Edinburgh Architectural Association.—Annual excursion to Norham Castle, Norham Church, and Ladykirk.

MONDAY, JUNE 13.

Royal Institute of British Architects.—Mr. T. G. Jackson, M.A., F.S.A., on "The Art of Dalmatia." 8 p.m.

Surveyors' Institution.—Annual Dinner, Holborn Restaurant. 6·30 p.m.

Society of Antiquaries of Scotland (Edinburgh). 3 p.m.

TUESDAY, JUNE 14.

Royal Statistical Society.—Mr. Joseph Rabino on "The Statistical Story of the Suez Canal." 7·45 p.m.

Glasgow Architectural Association.—Visit to Hyndland Church. 5·15 p.m.

WEDNESDAY, JUNE 15.

Society of Engineers.—Visit to Messrs. Aveling Porter's Works.

Royal Meteorological Society.—7 p.m.

Builders' Foremen and Clerks of Works' Institution.—Ordinary Meeting. 8·30 p.m.

SATURDAY, JUNE 18.

Architectural Association.—Visit to Cambridge. (See advertisement on p. xvi.)

Miscellanea.

Free Library, Bethnal Green.—The Corporation of London have voted a donation of 100 guineas to the 1,000*l.* required by the Bethnal Green Free Library Committee for the further development of the Institution.

Smethwick.—A new Primitive Methodist Chapel and schools are about to be erected in Regent-street, Smethwick, from designs by Messrs. J. P. Sharp & Co., architects, Birmingham.

A New Water-Bar for French Casements.—Mr. Samuel Elliott, of Newbury, is introducing a new water-bar for French casement sills, which is likely to prove absolutely reliable and effective.

Monument to Haydn.—A statue to Haydn, by Herr Natter, was unveiled at Vienna, in the presence of the Emperor, on the 31st of May. It is of rather more than life-size, executed in Carrara marble, with a pedestal of Tyrol fawn-coloured stone, on steps of granite. The monument stands in front of the Church of the Marien-Kirche.

Primley (Surrey).—The Rural Sanitary Authority have adopted the scheme of sewerage prepared by Mr. James Lemon, M. Inst. C.E., F.G.S., &c., and application will be made to the Local Government Board for their sanction to carry out the works. The principle adopted is that of filtration, the effluent being discharged into the river Blackwater.

The Sixth International Congress of Hygiene.—It is announced with regard to the special exhibition to be held in connexion with the sixth international congress of hygiene and demography, to which reference was made in the *Builder* of January 29 last, that intending exhibitors should send in applications for space not later than June 30, to the "Ausstellungs-Comité, Wien, I., Renngasse 20." The exhibition will be held in the rooms of the Imperial University, I., Frauzensring, from September 26 to October 2.

A New Museum at Liege.—A new museum, somewhat on the plan of the proposed Imperial Institute, has just been opened at Liège, called the Musée Commercial de Liège. Its object is to promote and develope the commerce of Belgium with foreign countries by always exhibiting such wares as are in demand abroad to the manufacturer. The museum is in consequence divided into two parts, viz., one for imports and one for exports, both embracing 386 classes in forty-four sections. With the museum is connected a bureau, the function of which is to give general commercial information of every kind to those who may apply for such, and to supply books, reports, &c., connected with the subject.

A Correction.—Mr. Aldridge writes to us in reference to a letter from a German architect (Herr Housselle) which he read at the Conference Meeting on Registration, and which was printed in our Conference Supplement (p. 750, *ante*), to say that in the titles "Kaiserlich-Regierungs-Bauführer" and "Kaiserlich-Regierungs-Baumeister," the word "Königlicher" should have been written in each case instead of "Kaiserlicher," as the architectural regulations mentioned were confined to the Kingdom of Prussia, and do not concern the German Empire. The mistake, we should add, is in the original letter as handed to us.

Lymington Sewerage Works.—The Local Government Board and the Board of Trade have approved of the scheme of sewerage prepared by Mr. James Lemon, M. Inst. C.E., F.G.S., at an estimated cost of 13,000*l.*, and we are informed the works will be proceeded with directly the necessary details and specifications can be prepared. The principle adopted is that of conveying the sewage to the sea by means of an iron outfall on piles across the mud for a length of about a mile and a quarter. The high-level will be drained by gravitation, and the low-level lifted by centrifugal pumps and Crossley's gas-engines above the level of the high-water spring tides. A large flushing-tank is provided to flush the outfall, and six smaller tanks are provided to flush the main sewers.

Sewage Sludge at Lincoln.—The Corporation of Lincoln, having been troubled for some time about the disposal of their sewage (more particularly the sediment), last year requested their City Engineer, Mr. R. A. MacBrair, Assoc.-Mem. Inst.C.E., to report upon the best steps that could be taken in the matter, at a moderate cost, as in these times they felt unwilling to incur the cost of purchasing additional land several miles out of the borough, which would be necessitated if they embarked solely in farming. After visiting and carefully comparing numerous sewage works in different parts of England, Mr. MacBrair recommended precipitation and the pressing of the resultant sludge by presses of the Brentford type, made by Messrs. Manlove, Alliott, Fryer, & Co., of Nottingham. The Sewage Committee, after consideration, approved of precipitation and pressing, and also being anxious, as fresh inventions are continually being produced, of having the best machinery for the latter purpose,—pressing,—visited the works at Wimbledon, Chiswick, Maidstone, Brentford, &c., the latter two places twice, and received detailed reports thereon from Mr. MacBrair and Mr. Teague, the latter being the Waterworks Engineer to the City. These investigations resulted in the Brentford presses being selected. Messrs. Manlove, Alliott, Fryer, & Co. have consequently received the order for the presses at a cost of 1,450*l*. The detailed building and other plans are nearly ready, and the machinery has been put in hand.

The Acton Drainage Scheme. — The Acton Local Board, at its usual meeting on Tuesday night last, resolved to adopt the magnetic ferrous carbon system of precipitation in the treatment of the Acton sewage, and to enter into a contract, under certain conditions, for five years and a half with the International Sewage Purification Company, which has been recently formed for the working of this system. The experiments conducted at Acton several weeks ago, and fully reported in the *Builder*, were so satisfactory as to induce the Board, after visiting many other works in the Thames Valley, to adopt the above-mentioned system, though the Board retains the option to cancel the agreement at the end of the first six months and end of three years. It was stated by the Chairman of the Board that in consideration of the facilities which the Board had given the company to publicly try their system at the Acton Works special terms had been offered the Acton Board, and the request was made that these terms should not be published. The company undertakes to produce an effluent which will be at all times satisfactory to the Thames Conservancy Board. It is contended for the system that, as there is no lime used, the full manurial qualities of the sludge is retained, while no smell is created during the process of clarification.

Southampton Deep Water Dock.—Good progress is being made with the works in connexion with the dock, for which Mr. A. Giles, M.P., is the engineer. The sea-bank, necessary to reclaim an area of about forty acres of mud-flats, has been closed, and the contractors, Messrs. S. Pearson & Son, of Westminster, are now able to proceed with the work of the dock proper, the site of which was formerly under water. Plant to a very considerable extent has been placed on the ground, and employment will be found for many hundreds of labourers and others. It is contemplated having the whole of the works completed in about eighteen months,—a very short time for works of such magnitude. Night-work will be required and used to a large extent, and artificial light employed for illuminating purposes. The dock, of which the water area is to be eighteen acres, will be an open dock, *i.e.*, tidal, and will have a depth at low-water ordinary spring-tide of 26 ft. Nearly 4,000 ft. of concrete wall has to be erected, 51 ft. 6 in. high, from the foundations, which are to be at a depth of 6 ft. 6 in. below the dock bottom. The approaches to the dock will be dredged to the same level as the dock, so as to give every facility to the largest vessels afloat for arrival and departure at every state of the tide.

The Coldbath Fields Prison Site.—The *City Press* states that Captain Penton, M.P., has received a letter from the Lords of the Treasury, stating that "part of the site of Coldbath Fields Prison is to be reserved for Post Office purposes, and until it is decided what part is to be thus utilised no decision can be come to with regard to the remainder."

Large Sales of Building Land in Surrey and Middlesex.—On Thursday week, the first portion of an ancient baronial estate, situated in the county of Surrey, at Byfleet, near Weybridge, was offered for sale in building plots, by Messrs. Baker & Sons. The property, which for many centuries past has belonged to Lord Pigot's family, and is adorned with choice specimens of cedars and various other species of ornamental timber, is at present being laid out for building upon. It is known as the Dartnell Park Estate, and is bounded on the east side by the river Wey, and on the north by the London and South-Western Railway and the Basingstoke Canal. The railway company are at present erecting a new station at Byfleet, close to the estate, which is to be opened in July, bringing the estate within half an hour's run from London. New roads, intersecting the estate, are now being constructed by Mr. Neal, road contractor, of Battersea. These roads are 50 ft. in width, and are all pipe-drained and metalled. Service water-pipes are all laid on, and, in addition, the owner is willing to provide an artesian supply. The number of plots offered on Thursday week was forty-three, the several plots having frontages ranging from 110 ft. to 140 ft., and containing an area of from three-quarters of an acre to an acre each. They were all submitted for sale without reserve, the stipulations providing that not more than one residence shall be built on any one lot, and that the cost of each house, exclusive of outbuildings, shall not be less than 700*l*. No trades or manufactories of any kind are to be allowed on the estate. The vendor undertakes, when half the entire estate is sold, to lay out a lawn tennis court, and to construct a boat-house and baths for the public convenience of the owners. All the plots offered were sold, the first lot submitted, consisting of a corner plot an acre in extent, realised 405*l*., the whole of the other lots, three-quarters of an acre in extent each, averaging from 130*l*. to 180*l*. each. The total proceeds of the sale amounted to about 7,200*l*.——On Monday last the same auctioneers offered for sale, in sixty-nine lots, the Staines Lodge Estate, occupying a central position in the town of Staines, immediately opposite the station of the South-Western Railway. The plots offered have frontages to the main Kingston road, and to intended new roads, the frontages varying from 25 ft. to 35 ft. each. They were sold at prices ranging from 60*l*. to 80*l*. each, an hotel plot having a frontage of 50 ft. to the Kingston road and a return frontage of 165 ft., realising 200*l*. The total sum realised by the sale was 3,460*l*.

The Local Government Board and Thames Valley Drainage. — The Local Government Board has given formal notice of its intention to issue a Provisional Order forming the urban and rural sanitary district of Richmond into a united district for the purposes of sewerage and sewage disposal, and constituting a Joint Board as the governing body for the same; and that a clause will be inserted in the confirming Bill relieving the Urban and Rural Sanitary Authorities of Richmond, for three years after the date when the order comes into operation, of any liability for penalties under the Thames Conservancy and Navigation Acts for allowing crude sewage to flow into the Thames. It is not expected that there will be any opposition to the formation of this new Joint Thames Valley Sewerage Board, as it is formed simply for carrying out a definite scheme at a cost of 100,000*l*., designed by Mr. Melliss, C.E., and approved by the Local Government Board, for the drainage of the five parishes of Richmond, Mortlake, Barnes, Petersham, and Kew, which were among the twenty-one parishes included in the area of the now dissolved Thames Valley Main Sewerage Board. A considerable section of the people of Shirley memorialised the authorities, urging them to close the manholes in connexion with the sewerage system of the town, where there is at present an insufficient supply of water to enable these openings to be properly flushed. An official of the Local Government Board has, after inquiry, recommended that seventeen ventilating shafts should be erected on the side of the road to replace these manholes. The Sanitary Authority had already closed many of these manholes, and it seems the result has been there as it has been in many other places, some of the sewage gas was driven into the houses of the poorer classes where disconnected sinks, waste soil-pipes, and soil-pipe ventilators are the exception rather than the rule.

PRICES CURRENT OF MATERIALS.

TIMBER.

	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	5 10 0	7 10 0
Teak, E.I. ....load	8 0 0	12 0 0
Sequoia, U.S. ....foot cube	0 2 3	0 3 0
Ash, Canada ....load	3 0 0	4 10 0
Birch ,, ...	2 0 0	3 10 0
Elm ,, ...	3 10 0	4 10 0
Fir, Dantsic, &c.	1 10 0	4 0 0
Oak ,, ...	2 10 0	4 10 0
Canada	3 0 0	6 0 0
Pine, Canada red	2 0 0	3 10 0
,, yellow	2 10 0	4 10 0
Lath, Dantsic ....fathom	3 0 0	5 0 0
St. Petersburg	4 0 0	5 10 0
Wainscot, Riga ....log	0 0 0	0 0 0
,, Odessa, crown	2 15 0	3 0 0
Deals, Finland, 2nd and 1st...std.100	7 0 0	8 0 0
,, 4th and 3rd	5 10 0	6 10 0
Riga	5 10 0	7 0 0
St. Petersburg, 1st yellow	8 0 0	13 0 0
,, 2nd ,, ...	7 0 0	8 0 0
,, white	6 10 0	8 10 0
Swedish	0 0 0	0 0 0
White Sea	7 0 0	16 0 0
Canada, Pine, 1st	18 0 0	24 0 0
,, ,, 2nd	10 0 0	15 0 0
,, ,, 3rd, &c.	6 0 0	9 0 0
,, Spruce, 1st	8 0 0	9 0 0
,, ,, 3rd and 2nd	5 0 0	7 0 0
Deals—New Brunswick, &c.	5 0 0	6 10 0
Battens, all kinds	4 0 0	10 10 0
Flooring Boards, sq., 1 in., prepared, First	0 8 0	0 11 0
Second	0 6 6	0 7 6
Other qualities	0 5 0	0 6 0
Cedar, Cuba ....foot	0 0 2½	0 0 3½
Honduras, &c.	0 0 3	0 0 3½
Australian	0 0 2	0 0 3
Mahogany, Cuba	0 0 4	0 0 7
St. Domingo, cargo average	0 0 4	0 0 6
Mahogany, Mexican, cargo av.	0 0 3½	0 0 4
Tobasco ,, ...	0 0 4	0 0 5½
Honduras ,, ...	0 0 3½	0 0 5½
Maple, Bird's-eye	0 0 6	0 0 8
Rose, Rio ....ton	8 0 0	11 0 0
Bahia	8 0 0	9 0 0
Box, Turkey ....ton	5 0 0	12 0 0
Satin, St. Domingo ....foot	0 0 5	0 0 9
Porto Rico	0 0 6	0 0 10
Walnut, Italian	0 0 3½	0 0 4½

METALS.

	£. s. d.	£. s. d.
IRON—Bar, Welsh, in London...ton	4 7 6	4 15 0
,, ,, in Wales	4 2 6	4 7 6
,, Staffordshire, London	5 10 0	6 0 0
Sheets, single, in London	6 15 0	8 10 0
Hoops ,, ...	6 0 0	7 0 0
Nail-rods ,, ...	5 15 0	6 10 0
COPPER—		
British, cake and ingot ....ton	42 10 0	43 0 0
Best selected	44 0 0	44 10 0
Sheets, strong....	50 0 0	0 0 0
Chili, bars	39 0 0	39 7 6
YELLOW METAL ....lb.	0 0 0	0 0 0
LEAD—		
Pig, Spanish ....ton	13 5 0	0 0 0
English, common brands....	13 10 0	0 0 0
Sheet, English	13 10 0	13 15 0
SPELTER—		
Silesian, special ....ton	14 7 6	14 10 0
Ordinary brands....	14 5 0	14 7 6
TIN—		
Straits....ton	103 0 0	103 12 6
Australian	103 5 0	0 0 0
English ingots	106 10 0	0 0 0
ZINC—		
English sheet ....ton	0 0 0	0 0 0

OILS.

	£. s. d.	£. s. d.
Linseed ....ton	21 17 6	22 5 0
Cocoanut, Cochin	31 0 0	33 0 0
Ceylon	23 15 0	25 0 0
Palm, Lagos	21 0 0	0 0 0
Rapeseed, English pale	24 10 0	0 0 0
,, brown	23 0 0	0 0 0
Cottonseed, refined	20 0 0	0 0 0
Tallow and Oleine	25 0 0	45 0 0
Lubricating, U.S.	5 0 0	6 0 0
,, refined	5 0 0	12 0 0
TURPENTINE—		
American, in casks ....cwt.	1 9 6	1 9 9
TAR—		
Stockholm ....barrel	0 14 0	0 14 6
Archangel	0 11 6	0 12 0

TENDERS

BETHNAL GREEN.—For new factory and stabling in Mount-street, Bethnal Green, for Messrs. G. H. Nicholson & Sons. Mr. C. R. Winter, architect :—

Higgs, Bethnal Green....	£8,997 0 0
Thomerson & Son....	7,945 0 0
Boyce, Hackney	7,490 0 0
Wall Bros., Kentish Town	7,067 0 0
Shurmur, Clapton	6,975 0 0
J. Anley, Dalston	6,970 0 0
J. & J. Greenwood	6,970 0 0
Perry & Co., Stratford	6,895 0 0
Brass & Son, Old-street....	6,773 0 0
Morter, Stratford....	6,743 0 0
Jackson & Todd....	6,449 0 0
J. R. Hunt, Bow	6,100 0 0

BETHNAL GREEN. — For houses, White-street, Bethnal Green-road, E., for Mr. P. J. Dixon. Messrs. T. & W. Stone, architects, 2, Great Winchester-street, London, E.C.:—

G. W. Beale	£580 0 0
B. Wire	550 0 0
G. Knight & Sons	548 7 0
C. Forrest	538 0 0
J. Godfrey & Sons	479 0 0
F. G. Higgs (accepted)	433 0 0

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Club Premises, &c., Scarborough	Constitutional Club Co.	25 gs. and 10 gs.	July 15th	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Forming an Area, and other Alterations	Whitechapel Union	*Official*	June 14th	ii.
Steam Pipes	Wndswrth & Claphm Un	T. W. Aldwinckle	June 16th	ii.
Drainage Works	Strood Union	*Official*	do.	ix.
New Sewers	Com. of Sewers	do.	June 17th	ii.
Tar Pavement	Chelmsford Local Brd.	C. Pertwee	June 20th	ii.
Making-up Road, Stoneware Pipe Sewers, &c.	Tottenham Local Board	— De Pape	June 22nd	ii.
Alterations, &c., to Post-Office, Falmouth	Com. of H.M. Works	*Official*	June 24th	ii.
Sewage Works	Gt. Yarmouth Cor.	J. W. Cockrill	do.	ii.
Reconstruction of Jetty	Lowestoft Town Council	G. H. Hamby	June 25th	ii.
Laundry and Rooms for Married Couples	St. Marylebone Grdns.	H. Saxon Snell & Son	June 27th	ix.
Covered Service Reservoir	Leicester Corporation	T. & C. Hawksley	do.	ii.
Painting and other Works, Darenth Asylum	Met. Asylums Board	A. & C. Harston	do.	ii.
Movable Street Fire Stations	Hornsey Local Board	T. De Courcy Meade	do.	ix.
Sewering, Levelling, &c., to Road	Hanwell Local Board	*Official*	June 28th	ii.
Wooden Drill Shed, Island of Lewis	Admiralty	do.	July 1st	ii.
Sewerage Works	Kingston R. S. A.	B. Latham	July 6th	ii.
Painting, &c., Repairs	Schl. Board for London	*Official*	Not stated	ix.
Enlargement, &c., of Schools	do.	do.	do.	ix.
Completion of Tower and Erection of Spire	St. Paul's Church, Forebridge	R. Griffiths	do.	ix.
Exhibition Buildings, Glasgow	The Executive Council	*Official*	do.	ix.

BICKLEY (Kent).—For building new mission church at Widmore. Mr. E. Newton, architect:—

Crossley	£1,446	0	0
E. A. Roome	1,437	10	0
Arnaud & Son	1,387	0	0
Maides & Harper	1,377	0	0

BROCKENHURST.—For alterations and additions to house and stabling at Whitley Ridge, Brockenhurst, for Major Talbot. Mr. W. H. Mitchell, architect, Southampton:—

H. J. Sanders, Southampton	£1,730	0	0
Dyer & Sons, Southampton	1,667	0	0
F. Recks, Lymington	1,662	7	4
C. Hayter, Lyndhurst	1,398	10	0
Stevens & Sons,* Southampton	1,396	0	0

* Accepted.

CAMBERWELL.—For additions and alterations to laundry, Camberwell House, S.E. Messrs. John Giles, Gough, & Trollope, architects:—

H. Ingram, Woking	£2,220	19	5
Coulsell Bros. Bethnal Green	2,145	0	0
R. Edwards, jun., Cambridge-road	2,125	0	0
Fred. Tarrant, New Kent-road	2,077	0	0
R. Rouse, Mutley, near Plymouth	2,007	0	0
R. A. Lowe, Lower Camden, Chislehurst	1,995	0	0
F. & H. F. Higgs, Loughborough Junction	1,950	0	0
W. A. Rhodes, 48½, Great Cumberland-place	1,948	0	0
J. Derry, Clapham	1,940	0	0
T. F. Hall, Godalming	1,930	0	0
G. Parker, Peckham	1,885	0	0
R. M. Priestley, Peckham	1,863	0	0
R. Pearson, Camberwell	1,840	0	0
A. M. Deacon & Co., Lower Norwood	1,829	0	0
Money Marsland, Chislehurst West	1,827	0	0
J. O. Richardson, Peckham	1,809	0	0
R. & E. Evans, Peckham	1,798	0	0
G. Stephenson, 173, Bishopsgate-street Without	1,760	0	0
W. & H. Castle, Borough	1,747	0	0
Webb & Rosser, Hammersmith	1,740	0	0
Engineers' Work.			
W. J. Fraser & Co.	2,959	0	0
J. & G. May	2,165	0	0
Z. D. Berry & Sons	2,099	0	0

CREDITON (Devon).—For re-seating and new floors in nave and aisles of the Parish Church of Holy Cross. Messrs. Hayward & Son, architects, Exeter:—

Gill, Devonport	£2,260	0	0!
Spiller, Taunton	1,290	0	0
Farr & Co., Kingsbridge	1,190	0	0
Berry, Crediton	1,110	0	0
Dart, Crediton (accepted)	1,030	0	0
Jones, Crediton	923	0	0!

DURLEY.—For the erection of house, stabling, and lodge at Snakemoor, Durley, for Mr. E. B. Bernard. Mr. W. H. Mitchell, architect, Southampton:—

Dyer & Sons	£3,888	0	0
Brinton & Bone	3,879	0	0
Chapman	3,723	0	0
Bull & Sons	3,582	0	0
Sanders	3,569	0	0
Stevens & Sons (accepted)	3,428	5	0

[All of Southampton.]

EAST HAM.—For new roads and sewers at East Ham. Messrs. Philip D. Tuckett & Co., surveyors:—

Rogers & Dickens	£1,127	0	0
Killingback	1,085	0	0
Felton	956	0	0
Potter, Clapton	899	0	0
John Jackson, Plaistow	840	0	0
Joseph Jackson, Upton	825	0	0
Rowland Bros., Penny Stratford	712	0	0
E. Wilson, Walthamstow (accepted)	683	0	0

HAMPSTEAD.—For new roads and sewers in the Cotton Estate at West Hampstead. Messrs. Philip D. Tuckett & Co., surveyors:—

Rogers & Dickens	£2,075	0	0
Watts	1,999	0	0
Nowell & Robson	1,979	0	0
Killingback (accepted)	1,850	0	0

HARGRAVE (Berks).—For alterations and additions to the Little House, Hargrave, for Dr. Morell Mackenzie. Mr. Arthur Ardron, architect, 6, Poultry, E.C.:—

Silver & Sons, Maidenhead (accepted)	£697	0	0

KENSINGTON.—For the erection of a house, No. 1, Challoner-street, West Kensington. Mr. Fras. L. Pither, architect:—

Edwards, jun., 262, Cambridge-road	£2,205	0	0
H. Ingram, Goldsworth-road, Woking	2,072	0	0
Rouse, 6, Duke-street, Manchester-square	1,972	0	0
Turtle, 40, Northcote-road	1,928	0	0
Dabbs, Portland-avenue, Stamford Hill	1,815	0	0
Reynolds, 60, Leghorn-road, Kilburn	1,774	0	0
Newton & Teck, The Chase, Clapham	1,773	0	0
Wivins, Holderness-road, Upper Tooting	1,747	0	0
W. & H. Castle, 15, Red Cross-street, Borough	1,743	0	0
Stephenson, 173, Bishopsgate-street Without	1,585	0	0
Leslie & Knight, 31, St. Mary Abbott's-terrace, W. (too late)	1,567	0	0

KINGSTON-ON-THAMES. — For new roads and sewers at Kingston-on-Thames. Messrs. Philip D. Tuckett & Co., surveyors:—

Rigby, Croydon	£1,100	0	0
Nowell & Robson	1,025	0	0
E. & W. Iles, Wimbledon	999	0	0
Killingback	975	0	0
Rogers & Dickens	963	0	0
Felton	924	0	0
Atkins, Kingston	830	0	0
Kavanagh, Surbiton (accepted)	796	17	0

LEICESTER.—For the supply and erection of about 925 yards lineal of a five-rail and post wrought wooden fence, bounding the road from the Catherine-street Viaduct to the Corporation Sanitary Depot, Leicester, on the Great Northern Railway land. Drawings, specification, and quantities by Mr. J. Gordon, M. Inst. C.E., Borough Surveyor:—

E. Taylor & Sons, Hinckley, Leicestershire	£559	4	4!
J. D. Gibbins, New Evington, Leicester	480	11	0
H. Black, Barrow-on-Soar	440	0	0
Jas. Evans, Birmingham	427	8	11
R. Turner & Sons, Bilston, Staffordshire	416	15	11
H. Hewitt, Stoney Stanton, Leicestershire	402	2	10
S. & E. Bentley, London	385	5	0
J. Stableford, Leicester	326	17	0
The Nottingham Mills Co., Nottingham	303	5	3
W. Gimson & Sons,* Leicester	289	18	0!

* Accepted.

LEICESTER.—For the supply and erection of about 710 lineal yards of wrought-iron hurdle fencing for the Corporation of Leicester at the Victoria Park. Drawings, specification, and quantities by Mr. J. Gordon, M. Inst. C.E., Borough Surveyor:—

H. Black, Barrow-on-Soar	£650	0	0
A. Barron, Leicester	579	12	6
S. Wright, Leicester	552	0	0
Brookes & Co., Wolverhampton	534	14	0
W. T. Burbidge, Leicester (accepted)	519	0	0
Gimson & Co., Leicester (withdrawn)	292	4	0

LEICESTER.—For the construction of a Macadam roadway about 480 yards long, and consisting of a width of 14 ft. of Macadam, and dressed granite random channels 2 ft. wide from the Catherine-street Viaduct to the Leicester Corporation Sanitary Depot on the Great Northern Railway land. Plans, specification, and quantities by Mr. J. Gordon, M. Inst. C.E., Borough Surveyor:—

James Evans, Birmingham	£949	14	6
J. D. Gibbins, New Evington, Leicester	651	9	4
H. Black, Barrow-on-Soar	630	0	0
H. Hewitt, Stoney Stanton, Leicestershire	620	16	3
A. Turner & Sons, Bilston, Staffordshire	586	7	9
J. Smith, Belgrave	584	17	11
S. & E. Bentley, London	576	5	8
J. Griffin, Leicester (accepted)	528	19	8

LONDON.—For alterations at the Brecknock, Camden-road, for Mr. Williams. Mr. E. J. Brede, architect:—

Gould & Brand	£239	0	0
Mattock	233	0	0
Kellaway, Clerkenwell	225	0	0
Ball & Wicks	189	0	0

LONDON.—For stabling, &c., at Arch-street, New Kent-road, for the London General Omnibus Company, under the superintendence of Mr. G. T. Lanham. Quantities by Mr. A. J. Bolton:—

Lawrence & Sons	£3,630	0	0
William Downs	3,537	0	0
Hack	3,498	0	0
Richens & Mount	3,420	0	0
Turtle & Appleton	3,410	0	0
Garrud	3,275	0	0
Knight	3,250	0	0
Haynes	3,200	0	0
Evans	3,185	0	0
George Parker	3,170	0	0
Toms	3,078	0	0
Stephenson	3,073	0	0
John Rider Hunt	2,972	0	0

LONDON.—For pulling down and re-building the Duke of York Public House, Myrtle-street, Commercial-road, E., for Messrs. Reid & Co. Mr. W. Ansell, architect:—

Palmer	£2,100	0	0
Lamble	1,981	0	0
Scrivener	1,888	0	0
Gooden	1,875	0	0
J. Anley	1,696	0	0
Jackson & Todd	1,643	0	0
J. Weale	1,598	0	0

LONDON.—For pulling down and re-building dwelling-house, No. 24, Upper Kennington-lane, Lambeth. Mr. J. A. T. Woodward, architect, Kennington Oval:—

W. Smith	£1,365	0	0
Langdale & Hallitt	1,350	0	0
Ford & Co.	1,288	0	0
Hooper	1,261	0	0
Baighton	1,250	0	0
Marsland	1,235	0	0
Scott	1,210	0	0
Beale	1,198	0	0
Higgs	975	0	0

LONDON.—For sundry repairs to be done at Nos. 6 and 7, Woodville-grove, Mildmay Park, N., for Mr. Wm. Hurran. Mr. W. F. Potter, architect:—

J. Barnes & Co., Stamford Hill	£135	0	0
C. & W. Barratt, Stoke Newington	120	0	0
J. T. Peppiatt, Hoxton	112	0	0
C. Dearing & Son, Islington (too late)	105	0	0
W. Wythe, Dalston	103	0	0
S. Hayworth & Sons,* Kingsland	98	0	0

* Accepted.

LONDON.—For the erection of warehouse, Southampton-street, Fitzroy-square. Messrs. Eliloart, architects:—

		Extra *
Perkins	£1,392	£60
Larter	1,370	50
Staines	1,348	50
Burnham	1,333	75
Macey	1,320	68
W. L. Kellaway, Clerkenwell	1,303	66

* Extra if brickwork in cement.

LONDON.—For repairs and decorations at the Nell Gwynne, Pimlico-road, S.W., for Messrs. Watney & Co., Limited. Mr. J. G. Esser, surveyor:—

Kynoch & Co.	£218	0	0
McLachlan & Son	198	0	0
Haylock	184	0	0
J. J. Bryant (accepted)	180	0	0

LOWESTOFT. — For the construction of various sewage works, ejector chambers, manholes, ventilating shafts, the laying of cast-iron pipes under the harbour of Lowestoft to the sea outfall and other subsidiary works, for the Lowestoft Town Council. Mr. G. H. Hamby, Borough Surveyor:—

Hughes & Lancaster, Chester	£13,696	0	0
J. W. & J. Neave, Leytonstone	10,596	0	0
W. J. Botterill, London	10,503	0	0
Woodman, Hill, & Co.,* London	8,810	0	0
H. E. Beatley, London	8,119	0	0
G. Bell, Tottenham	8,051	0	0
J. L. Cattell, Lowestoft	7,112	0	0
Pickthall & Sons, Merthyr	6,871	0	0

* Accepted.

ORGANFORD.—For the erection of a pair of cottages for Mr. James B. Dugdale, at Organford. Mr. W. Watts-Fookes, architect, Wareham:—

Knight, bricklayer Baker, carpenter Cleal, painter	£347	0	0

ORPINGTON (Kent).—For alterations and decorative repairs to private residence. Mr. St. Pierre Harris, architect:—

T. Heath, Orpington	£231	0	0
W. R. Taylor, Orpington	218	0	0
F. Wood, Chislehurst	197	0	0
H. Somerford & Son,* Clapham	176	0	0

* Accepted.

ORPINGTON (Kent).—For the erection of new Sunday schools in the rear of the Baptist Chapel. Mr. St. Pierre Harris, architect:—

Higgs & Hill, South Lambeth	£1,030	0	0
W. Holt, Croydon	980	0	0
Taylor & Son, Bromley	937	0	0
Somerford & Son, Clapham	920	0	0
F. Wood, Chislehurst	883	0	0
T. Knight, Sidcup (accepted)	829	0	0

ORPINGTON (Kent).—For additions and repairs to cottage. Mr. St. Pierre Harris, architect:—

H. Somerford & Son,* Clapham	£150	0	0

* Accepted.

RAMSGATE.—For new shop front and alterations to No. 3, High-street, for Miss Stokes. Messrs. Hinds & Son, architects:—

Salter, London	£235	14	0
Duckett, Ramsgate	170	0	0
Miller, Ramsgate	160	0	0
Paramor, Margate	125	0	0
Martin, Ramsgate (accepted)	110	0	0
White Bros., Ramsgate (withdrawn)	99	0	0

SHEPHERD'S BUSH.—For alterations and additions to Broomsgrove Villa, 280, Goldhawk-road, for Dr. Campbell Pope. Mr. J. H. Hayes, architect:—

W. H. Ashfold & Co., St. Andrew's Estate, West Kensington	£710 0 0

[No competition.]

SOUTHAMPTON.—For new infant school and classroom, Fitzhugh, Southampton, for Mr. A. Barlow. Mr. W. H. Mitchell, architect, Southampton:—

Stevens & Sons	£747 0 0
J. W. Roland	698 0 0
A. Warden (accepted)	648 0 0

SOUTHAMPTON.—For new shop front and other works, Nos. 72 and 73, East-street, Southampton, for Messrs. A. & F. Kay. Mr. W. H. Mitchell, architect, Southampton:—

Dyer & Sons, Southampton	£165 0 0
Brinton & Bone (accepted)	155 0 0

SOUTH KENSINGTON.—For alterations, &c., to Nos. 1 and 2, Moreton-terrace, Old Brompton-road, for Mr. T. S. Richard. Mr. J. A. J. Keynes, architect:—

Toten & Sons	£579 0 0
H. Smith	498 0 0
W. H. Smith	485 0 0
Simmonds Bros.	483 0 0

SPALDING.—For erecting houses, Park-road, Spalding, for Mr. H. S. Maples. Mr. Joseph Sawyer, architect, Spalding. Quantities prepared by the architect:—

	Nine houses.			Five houses.		
H. S. & W. Close, Lincoln	£1,600	0	0	£900	0	0
Jepson & Baker, Spalding	1,560	0	0	865	15	0
J. R. & J. A. Bateman, Sutton Bridge	1,545	3	2	858	8	5
T. Pick, Spalding	1,543	0	0	851	4	6
J. Moore, jun., Spalding	1,527	0	0	848	6	8
C. Harrisson, Spalding	1,507	0	0	837	4	4
S. Dawson, Spalding	1,498	10	0	832	10	0
E. A. Watson, Spalding	1,439	0	0	800	0	0
S. Hipwell, Wisbeach	1,420	0	0	827	0	0
J. Rowe, Peterborough	1,395	0	0	785	0	0
H. J. Osborne, Preston	1,382	10	0	768	1	3
J. Holmes, Wainfleet	1,355	0	0	758	0	0
W. Greenfield, Boston	1,330	0	0	730	0	0
E. Bowman, Stamford	1,290	0	0	734	0	0
W. H. Lyon,* Stamford	1,170	0	0	670	0	0

* Accepted.

TAPLOW.—For a house on the Amerden Estate, Taplow. Mr. C. Innes, architect:—

C. W. Cox, Maidenhead	£1,535 0 0
Prestige & Co., London	1,377 0 0
Macey & Sons, London	1,370 0 0
G. Almond, Burnham	1,348 0 0
Silver & Sons, Maidenhead	1,330 0 0
Woodbridge, Maidenhead (accepted)	1,325 0 0

WALTON-ON-THAMES.—For additions and alterations to Percy Lodge, Walton-on-Thames. Messrs. John Giles, Gough, & Trollope, architects:—

F. T. Hall, Deanery Works, Godalming	£528 12 6
W. Butt, Hersham, Surrey	520 0 0
T. King, Oatlands Park, Surrey	508 0 0
A. Newland, Cobham, Surrey	500 0 0
H. Ingram & Son, Woking, Surrey	480 0 0
R. Wood, Cobham, Surrey	463 0 0
W. & A. Brown, Oatlands, Surrey	460 0 0

WEST HAM.—For house, West Ham Park, for Mr. W. R. Dodson. Messrs. T. & W. Stone, architects, 2, Great Winchester-street, London, E.C.:—

J. Jarvis & Sons	£1,493 0 0
W. Gregar	1,487 0 0
F. G. Higgs	1,337 0 0
J. Walker	1,313 0 0
G. W. Beale	1,225 0 0
R. Edwards, jun.	1,125 0 0
Dabbs	1,000 0 0
J. Howlett (accepted)	995 0 0

Alterations, Alliance Bank, Battersea.—In reference to the list of tenders which appeared in the *Builder* for May 21, we are asked to state that the amount of Mr. F. R. Turtle's tender was 1,163*l.*, and not 1,135*l.*

*** SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than 12 Noon on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

J. S. (too late for this week).—E. A. R. (should send amounts in all cases).—"Pro Bono Publico."—R. B.—Sanitary Institute (too late this week).—O. M. W. S.—H. O. C.—A. G.—R. G. H.—W. F. B.—T. G. W. (cannot say at present).—F. T. B.—H. C. W. B.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication

We are compelled to decline pointing out books and giving addresses.

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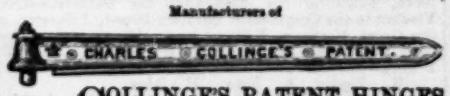

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SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY mornings.

The Publisher cannot be responsible for DRAWINGS TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

PERSONS Advertising in "The Builder," may have *Replies addressed to the Office, 46, Catherine-street, Covent Garden, W.C. free of charge.* Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

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*** Omissions discovered since publication will be corrected before mounting.

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